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RUTTAN'S

VENTILATION

AND

WARMING;

OR,

How to Make Home Healthy.

AIR, LIGHT, FOOD, DRINK;

BY H. M.

ALL ORDERS FOR VENTILATORS TO BE SENT TO E. AND C. GURNEY, FOUNDERS, TORONTO OR HAMILTON, *or to* H. J. RUTTAN, COBURG.

PETERBOROUGH, ONT.
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Ventilation.

CHAPTER I.

In these days every school-boy knows something about Ventilation. He knows, for instance, that people must have a large and constant supply of fresh air, if they would preserve health and life;—he knows that the breath of man is the most deadly poison—that "collected in a jar it will kill mice, and accumulated in a room, it will kill men!" And if he have the misfortune to gather knowledge, not from a tree in a garden, but from the desk of a close school room, he has a practical experience of the pursuit of knowledge under difficulties, and soon finds, without reading about the Black Hole of Calcutta, that mind and body are both suffering for want of fresh air. If our school boy is a fisherman and catches "shiners" to bait for bass, he has probably often seen his bait turn on their backs in his pail of water, and after a little choking, quietly expire; and he knows the cause, viz: want of air,—that in the water is exhausted, and he has not put fresh water in to supply its place.

Were a modern ball-room or dwelling air-tight, the inhabitants would soon share the fate of the "shiners;" but luckily for them, neither carpenter nor mason work has reached that point of perfection, so they are only slightly suffocated and poisoned, and soon come to life in the fresh air. Doubtless many will exclaim against this. The entranced *Augustus* will repudiate with scorn the idea that when *Angelina* reposed on his arm in a polka and whispered that she loved him everlastingly, it was only poisoned air rendered sonorous by the action of a laryn, tongue, teeth, palate and lips.—"What folly!" the old fogies will say, "to insinuate that breath is hurtful—just as if nature did not know when she made man a social animal, whether breathing each other's breaths, would prove injurious." Nevertheless both old and young will, immediately after expressing contempt for ventilation, complain of the *closeness* of the room, or steamer, or railway car, and rush to the door for relief.

But notwithstanding the ignorance and unbelief of a great portion of the world, scientific men are still busily engaged in devising ways

and means to protect man by means of physical and *mechanical* ventilation, from being poisoned by his fellow man. We have now all sorts of ingenious contrivances under the second system,—fanners, forcing pumps, sucking pumps, screws and other contrivances, too numerous to mention. In 1663, H. Schmitz published the scheme of a great fanner, which, descending through the ceiling, moved to and fro, pendulum wise, within a mighty slit. The movement of the fanner was established by means of clockwork, more simple than compact: it occupied a complete chamber over head, and was set in noisy motion by a heavy weight. The weight ran slowly down, pulling its rope till it reached the parlour floor. As for the screws they are admirable on account of the startling results sometimes produced. Not many years ago a couple of fine screws were adapted to a public building, one to screw the air in and the other to screw it out,—but horror of horrors, both screws blew down with a gust of contempt upon the airy projector. Of the fanners it is not worth while speaking; they answer admirably for cooling the air in India, where a servant can be kept to move one in each room; and Mr. BARRY's monster fanners, moved by steam, cool the air for the British House of Commons at an expense of over half a million dollars. But as for ventilation—that is circulating fresh air—they are perfectly useless. So far, then, as *mechanical* ventilation adapted to buildings is concerned. it may be pronounced a failure.

But *Physical Ventilation*—that which imitates the process of nature, and whose chief agent is heat, has at length established itself as a great success. In nature it is said—the *Sun* is the lord-high ventilator. He rarefies the air in one place by his heat, elsewhere permits cold and lets the air be dense; the thin or warmed air rises and the dense air rushes to supply its place, so we have endless winds and currents, Nature's ventilating works. Of course, a common fire-place with a quarter of a cord of wood, or a hundred weight of coal, is a good imitation of the *Sun's* system—the fire makes an ascending current, and the cold air rushes from the doors and windows to the chimney, as from surrounding countries to the burning deserts, as the draughts about the legs, necks, and backs prove to the most sceptical. While one side is being toasted, the other side is being frozen, so that a man has to revolve as on a spit, in order to let each side have its proper quantity of heat and cold. The old settlers have a superstition that so soon as they build a new house and move into it they are sure to die. This has a good deal the appearance of being the rule. But the reason is, not that a supernal power envies their new abode, but that they themselves are the authors of their own

misfortunes. For instance, an old couple have been in the habit all their lives of living in a log house, with walls, windows and doors not over tight and a dutch fire-place, which when in full blast would almost carry one of the youngsters out at the chimney top. In other words—they live in the midst of a most splendid system of ventilation, and as a consequence enjoy the most robust health. From this they move to a new house with no fire place whatever and no open flues. Here they sit themselves down by cooking or parlor stoves, and half stupified by the foul and overheated air, dream of long years of happiness. Soon, however, the blood becomes less and less pure and disease sets in to obtain an easy victory!

How differently all this might be managed; how easily such a misfortune might be remedied. With open flues or fire places in each room, and a ventilating stove in the hall connected by a pipe with the air without, not only would there be no draught, but every room in the house would be kept at the same temperature by a constant stream of warmed, not heated air, which would be changed and replaced by fresh air every four or five minutes during the day. "Yes, yes," a venerable old lady will say, "I suppose I might have "all this at the expense of a hole or *flue* as you call it in every room, "but you don't catch me spoiling the appearance of my rooms for the "sake of ventilation!" It is in vain to tell such people that a house with open flues in every room can be built at the same expense as a house with no flue at all—the real objection is the *hole in the wall*—however neatly it may be disguised by ornamental registers or fans. The best of the joke is that the same parties who object to flues or fire places, will stick the walls full of windows. They will have something nice to look at no matter how filthy and unhealthy the *air food* which they are inhaling to cleanse the blood!

Thanks to modern architects, if we go to church we can dose through the most delightful sermons. If we go to balls or concerts or public meetings, we can pant after fresh air, and come home with head-aches, inflammations, and incipient consumptions. Long may they believe that lungs are wind instruments of brass; and let us hope that when they do get a ventilating fit they will prefer strange machines, pumping, screwing, steaming apparatus, to the simple pure air of heaven, which requires but a pipe and a ventilating stove to set it floating day and night through all our dwellings.

The celebrated HUMBOLT, who died the other day, considerably over ninety years of age, attributed the good health he enjoyed to his love of fresh air. He tells us that in one of his travels on

ship-board, a sailor was reduced by fever to the last gasp, and at his earnest request was taken on deck to die. But strange to say he no sooner felt the cool air than he began to revive, and he eventually perfectly recovered.

Those then who exclude the fresh air from their lungs, take the first important step towards ruining their constitutions. The more they sit in close rooms over that wholesale destroyer the *box-stove*, the more tender they become and the more they crave cloaks, coats, wrappers, comforters, India rubbers, and all the other blessings of this life. "Look!" they exclaim, "at the progress of Man. Who ever saw a *Lion* in cork soles, or with a sore throat? Can the *Tiger* mount his great coat when he goes out to a social party? Does an Eagle soar with an umbrella over his head to keep off the sun or rain?" Man alone, comprehends these luxuries; and it is when he is least healthy that he loves them best.

But sitting by stove heat in an unventilated room is nothing to sleeping in a close bedroom. Whoever travels a good deal is often shown to a room with a chimney indeed, but closed with a fire board, so that there is no possibility of the foul air escaping during the night. There is not even a stove pipe hole into the chimney, which the landlord, with a praisworthy care for the health of his guests, has not stopped either with tin, cloth, or wood. There is a lock on the door so that you may shut in all the foul air, and keep it in. If you happen to be a man of note, you are probably shown to the best room that contains a suffocating machine called a curtained bed. So it is not enough to have diluted foul air, it must be condensed as close as possible round your person. This may be called the Poison Vapour Bath, and is enjoyed in the greatest perfection in a feather bed. The feathers prevent the transpiration through the skin, and most effectually smother the flesh. But then lying on feathers is a sign of gentle breeding. An ancient writer tells us how a king's wife found out whether her lady guest was a real born princess. She placed three peas in the young lady's bed, and over these fifteen feather beds. In the morning the young lady complained that she had been prevented sleeping by the lumps under her sheets. So you see blood will tell. Next to the close stove room, the unventilated bed room and feather bed are the most ingenious contrivances for the destruction of human life, and to complete the business many people cover their heads with night caps, or stick them under the bed clothes till they are obliged to put out their noses to prevent actual suffocation!

If I were to treat in scientific terms upon the properties of air, I might be as unfortunate as the young Cambridge student who was airing his wisdom at a dinner party. He was most eloquent upon heat and cold, radiation, rarefaction, polar and equatorial currents, &c.; when he had brought his discourse to an end, he turned round upon a grave Professor of his college, saying, "And what, sir, do you believe to be the cause of wind?" The learned man replied, "Pea-soup, pea-soup!" So I shall avoid as much as possible, scientific or uncommon terms, and content myself with describing to you in a plain way, some of the commonest properties of air.

Air is composed of two simple elements, and one compound element in very small proportions. About 80 parts in an 100 of the air, is composed of a kind of air or gas called nitrogen, a simple element and apparently of no use except to dilute the oxygen, the name of the other simple element, a gas or air composing about 20 parts in an 100 of the atmosphere. The compound element is also a gas called carbonic acid, and forms about one part in 2000 of pure air. It is compounded of oxygen and carbon, a simple element or substance which composes the greater part of coal and gives to it its chief characteristics.

The air cells of the lungs are filled upon the principle that gravition causes air to rush into any cavity. These are situated on either side of the chest, and communicate with the air through the windpipe and nose, or mouth. Three evident effects are produced upon the blood in the lungs by the action of air. Its color is changed from a purple to a bright red, its temperature is raised, and it is diminished in quantity. Doubtless other effects are produced, but about these there is no dispute. The degree of effect produced, depends upon the quantity and quality of air to the action of which the blood has been subjected in the lungs.

The composition of the air has been already stated; but after it leaves the lungs it is very different; instead of 20 parts in an 100 it contains but 16 of oxygen, and contains nearly 4 parts of carbonic acid. It is very full of moisture as may be seen by breathing upon glass. Its proportion of nitrogen has not changed in an appreciable degree. If a person apply his mouth to the mouth of a bell-glass bottle or decanter, the bottom of which is wanting or has a hole broken in it, and then push the bottle a short distance into a pail of water, he can draw all the air in the bottle into his lungs, from which he can breathe the air back into the bottle. This must be so held in the water that it shall follow up into the bottle as the air is drawn

out, and when the bottle is again filled with air, it must be held quite steady, with the mouth yet applied to it and the bottom yet in the water. In the meantime let a match be lighted, and when it is burning well, remove the mouth and drop the bottle about an inch into the water, and thrust the match into the mouth of the bottle, when, if the experiment have been well managed, the match will instantly go out. Showing that the air is so changed in the lungs that a match will not burn in it. If any one requires practical proof of the unhealthiness of air after it has been once breathed, let him inhale the air from another person's nose or mouth, or step from the cool fresh air of morning into a crowded unventilated railway car which has travelled all night.

Then, as the air coming from the lungs is not suitable to be received again, and as a large quantity is used in a very little time, it follows that all rooms should be perfectly ventilated, by having communication with the Grand reservoir—the atmosphere surrounding the earth. This should evidently be more carefully attended to during the night than during the day, as then the opening and shutting of doors, and the fires in cold weather, will tend to purify and change the air in a room. Experiment and accident have proved that carbonic acid breathed out from the lungs is so very poisonous that 10 per cent will destroy the life of animals, and many human beings have lost their lives by going into wells, tombs and other places where it existed. The burning of most articles produces a great deal of it, coal a vast quantity when burning, and a pan of coals placed in a chamber has produced so much as to destroy life. If a grate do not draw, the gas is likely to pass into the room without any smoke, a great cause of headaches, &c. Doctor *T. S. Lambert* above quoted, says; "In regard to pure air, the old adage seems true, 'nothing cost, nothing worth.' If air could be monopolized and sold by the gallon, its value would soon be appreciated. He continues—'A healthy state of the body generally, with active exercise of all parts of the body, but particularly the muscles of inspiration and expiration, and *ventilated* apartments, are the chief things which conduce to the perfect action of the air and blood upon each other in the lungs. And as it has been seen that one of the chief, if not *the* chief duty of the lungs, is to produce heat, it follows that if a person would be warm he must preserve his general health, take exercise, and *breathe pure air!* Hence it is to be inferred, that a person will sleep warmer the coldest night in winter, with his apartment ventilated, which cannot be done perfectly except there be communication with out doors.—Especially during the night will a person be kept warmer and be in

less danger of taking cold, if a sleeping apartment be ventilated, not in such a manner that a draught of air shall come upon the person, but at the same time perfectly."

Thus we see that pure air acting on the blood produces health, and foul air disease and death. But our object is not to write an essay on air, but on the means of bringing it into our dwellings and Railway cars.

We have said that mechanical ventilation as applied to houses, is a failure. Not so mechanical ventilation as applied to Railway Cars, as those of our readers who have travelled in RUTTAN'S ventilated cars on all the leading roads of the west, can testify. There we see that by means of a ventilating cap on the top of the car, a continuous stream of air, purified in summer by passing over a large shallow tank of water, is furnished to the inmates of the car. The same quantity of air is also supplied in winter, but warmed by means of a simple but most efficient ventilating stove. No matter how much dust there is outside, not a particle comes into the car, because it is deposited in the water tank underneath. And no matter how much filthy tobacco is spit or blown out of the mouths of the passengers, or how diseased their lungs or throats may be, the strong downward current of air carries off the perfume without compelling their fellow passengers to swallow it. Indeed, so perfect is the working of RUTTAN'S system in summer that the passengers enjoy the benefit of steamboat, with the rapidity of railway travelling. His motto is "pure air and plenty of it."

As regards RUTTAN'S mode of ventilating houses, we have not space to describe it, but we may say that he puts LUNGS into the building. That day and night, in summer and winter, there is a stream of fresh air, pouring through every room in the house. Of course it is warmed in winter by passing through a ventilating stove —or a *ventilator* as Mr. Ruttan delights to call it. This is the kind of ventilation which we denominate *physical*, because it imitates the action of nature. As the heat of the desert draws the cold air from surrounding countries, so the ventilating stove attracts to it the cold air from outside the house or the railway car, and this warmed air expels the cold air and takes its place.

But as praising any particular system of ventilation may offend some hot-water or hot-air architect, we will leave this particular branch of our subject at present, and devote a few pages to considering other causes of ill health than the want of fresh air.

CHAPTER II.

TRAVEL where we will, whether on railways or steamers, enter what society we may, we find nine-tenths of our fellow mortals suffering from ill-health. Why is this? Because from the cradle to the grave we set the laws of health at defiance!

No sooner is the blessed baby born than the watchful nurse crams down its throat a dose of physic, and fastens its first dress with innumerable pins. What the calomel and honey, or castor oil, is unable to effect inside, a sly prick effects outside, and the troubles of the little "pale face" begin. Ten to one that the doctor is sent for and other doses are rapidly administered, some preparations of laudanum probably, when the little sufferer is put into a cradle and by active rocking sent to sleep by producing giddiness, giddiness being a disturbance of the blood's usual way of circulation. Perhaps when the dress is changed, the establishment of the *raw* will be discovered. But the nurse has learned one thing in the mean time, viz: that preparations of laudanum save a world of trouble, and that giddiness if it does not produce healthy sleep, at all events, produces quiet! The next torture the poor child undergoes is to be awakened out of its sound sleep to have some food. Nature of course does not know how often the infant ought to be fed, (although she would feed it every four hours,) so she is to be taught a lesson. After the food, the child is to be put to sleep again, either by the rocking chair, the cradle or some of *Mrs. Winslow's* soothing syrup.

Well you have the baby at advantage—so pitch into it while you can. Vary its pleasures by alternately suckling and physicing it, attempt no regularity in nursing, keep its stomach in a perpetual ferment, and you lay the foundation of a dyspeptic constitution and a miserable life.

In weaning a child, most people are guided by their pleasure or their convenience, they will not allow nature to have a hand in the business at all, but will wean either before the first teeth are cut, or after they have arrived at the biting point. Then instead of weaning gradually, they wean all at once, by means of bitter aloes or some other drug.

Most houses are so constructed that no fit room is retained for a nursery. Indeed, in most cases, a common unventilated bed-room

is the only convenience for the nurse and three or four or more children. In this room there is perhaps one window, which is kept carefully closed and stuffed all winter, so as to keep out draughts! If there be a chimney, it is of course closed with a board, and the door is shut to keep *in* the noise. Here the poor delicate things grow up like stalks of celery, white and tender, and by the same process—the exclusion of light and air. Then, as if the mother really wished to decrease the population, they are sent out to walk in thin upper dresses and *bare legs.* How would mamma and papa like to be treated in the same way? Would they not find it rather cool comfort to imitate their first parents in this climate? and yet their children are of the same flesh and blood as themselves! This exposure of children is one reason of the great increase of consumption, and should be discountenanced by every thinking parent.

Children should sleep, eat, and exercise regularly; let them not be tempted to do one or the other out of the regular course. On no pretence whatever let them "piece" the day through. The stomach requires three or four hours to digest a meal, expects a moderate routine of tasks, and between each task looks for a little period of rest. Yet how little are these requirements heeded. Cakes and sweetmeats of alluring shape and color, with other palatable messes, are invariably added to the diet of our children, and are mostly given between meals. In this way the stomach, if not actually poisoned by colored candies, is kept in a constant state of irritation the child becomes pale and sickly, and the triumph over nature is complete! Let a man place himself in the position of a child; let him awake some fine morning with a dose of castor oil going down his throat; let him then be washed and swathed in a dress which shall be stuck full of pins, one or two of which are thrust half an inch or so into his flesh, let him then swallow a dose of laudanum, and on the top of that be rocked to the verge of apoplexy in a cradle. After he has been asleep for a couple of hours from sheer exhaustion, let him be awakened by a pickled herring being thrust into his mouth, *and see how he would like it!*

But supposing, contrary to probability, that the child becomes a man, let us see what he does to renovate his constitution. Ten to one he has been manufactured on the forcing system, into a merchant or a professional man, and has taken up his abode in some densely populated quarter, in order to be near his office. Nature intended him to be broad chested and straight backed, but thanks to early

training and confinement he is narrow chested and stoops forward, the shoulder blades projecting like the wings of a bird. What his wife and daughter have accomplished through the agency of stays, he has accomplished through study and want of exercise. He don't see why his own lungs and the lungs of his wife and daughter should have room to play. He never played himself and don't believe in it. True his wife and daughter admired the English cricketers last fall, and wished perhaps with Desdemona, "that Heaven had made them such a man" as one of these. Doubtless they thought them a superior race, never considering that fresh air and exercise might have conferred the same boon upon the husband and the brother. It is unfortunate that the lungs have any work to do, but they have and rather important work too, it being no less than to put the breath of life into the blood which they are unable to do properly when cramped for space. By this compression of the chest, men as well as women are rendered nervous and incapable of much exertion and fall an easy prey to the Doctor and the Sexton.

The ladies, however, do not allow us to suppose that they have lost flesh. There is a fiction of attire which would induce in a speculative critic the belief that American women have caused wha should be in their waists, to bulge up some inches higher before, and some inches lower behind. But on application to a female doctor or milliner it will be found a groundless theory, for these prompters behind the scenes, do not hesitate to assert that the ladies are the same all the way down. We have hinted at our gentleman's occupation, let us now see what is his recreation! Does he go to the gymnasium, or the cricket field? Nay, does he even play ten pins or base ball? No, none of these things move him, but about ten o'olock at night he goes out with his wife and daughter to *spend the evening*. Thinly clad and packed in a close carriage they arrive at their hosts, jump out on the cold pavement, in thin boots and shoes and run shivering into the house. Instead of keeping from the fire, as all chilled people should, they rush up to a red hot stove in a dressing room, from whence they descend to drink a cup or two of some hot liquid called tea or coffee. From thence they enter the dancing room, where, from want of ventilation, the upper sash of the window has been let down, or the lower sash raised—"it is so very hot." Here a nice country nose will at once detect the nasty foul air, tho' it is mixed with eau-de-cologne. Now the gentleman cuddles some lady, and the ladies are cuddled by some gentlemen, and they spin around the room like teetotums. Presently they take an ice—then a spasm, then another dance, then a walk on the verandah "it is so very

hot"—then a glass of wine, then another ice—then maccaroons, then supper. Sandwich, turkey, patties, champagne, blancmange, bonbon, champagne sherry, tipsey cake, brandy cherries, wine jelly, maccaroon trifle, mottoes, custard, &c., &c., &c. In conclusion, perhaps some old fashioned person proposes the health of the host and hostess. Certainly, why not! But the demon or rather Daimon, genius, or evil spirit of Dyspepsia, grins horribly, and mutters, yes, yes, all your very bad healths! At 5 a. m., with stomachs full of indigestion, splitting headaches, and glassy or inflamed eyes, our company return home and go to bed.

But it is not in the house alone that ladies strive to thwart nature. To keep their faces pale and have them

"Sicklied o'er with the pale hue of thought,"

it is not sufficient that they pull down the blinds. They must when they go out for exercise! save the mark!—put a veil between their countenances and the sun, and carry on high a great shield named a paaasol, to ward off his rays. They know better than to let the old god kiss them into color as he does the peaches. No, they will remain green fruit to the end of the chapter, and do all in their power to eradicate what little of the rose their folly has left. They prefer being like the lilies, "which toil not, neither do they spin, yet I say unto you that Solomon in all his glory was not arrayed like one of these!" Do these fair, frail creatures ever read! If they do, have they not seen that in times of pestilence, death, who loves the dark, strikes three victims on the shady side of the street, for one on the sunny side? Did they ever see a house shielded from light and heat by trees, that was a healthy abode for man or beast? Never. Yet they will persist in keeping their blinds down for fear of faded curtains or carpets, whilst they themselves moulder into early graves.

We don't know which is the greater benefactor, T. C. Keefer, who gives us pure water in abundance out of all sorts of impossible places, or Ruttan, who gives us air. One thing is certain, that if these two reformers, the one with his fresh air the other with his fresh water, are allowed to go on much longer, they will compel us to be more healthy in spite of ourselves. Will not some other sanitary reformer arise and give us "light in our dwellings." There is quite as much difference in the healthfulness of artificial and natural light, as, there is between the two luminaries in size and brilliancy. The light which comes down from the sky, not only eats no air out of our mouths, but it comes charged with mysterious and

subtle principles which have a purifying, vivifying power. It is a powerful ally of health, and we make war against it. But artificial light contains no such blessings. When the gas streams through half a dozen jets into your unventilated room, and burns and there gives light; when your candles become shorter and shorter till they are burnt out,—*Do you know what happens?* Nothing in nature ceases to exist. Your camphene has left the lamp, but it has not vanished out of being. Nor has it been converted into light. Light is a visible action; and candles are no more converted into light when they are burning, than breath is converted into speech when you are talking. The breath having produced speech, mixes with the atmosphere; gas, camphene, coal oil, and candles, having produced light, do the same. If you saw fifty wax lights shrink to their sockets during the past week in an unventilated ball room, yet, though invisible, they had not left you; for their elements were in the room and *you were breathing them!* Their light had been a sign that they were combining chemically with the air; in so combining they were changed, *but they became a poison!* Every artificial light is, of necessity, a little workshop for the conversion of gas, oil, spirit or candle into respirable poison. You will therefore see that the more we have of such a process, the more need we have of ventilation. While upon the subject of light, we may mention that the best plan for weakening the eyes and necessitating the use of glasses, is to read or work by a fluctuating light. By fluctuating light is meant a candle that requires snuffing, or a lamp that requires turning up. The joke of them consists in this: they begin with giving you sufficient light, but as the wick grows, the radiance lessens, and your eye gradually accommodates itself to the decrease; suddenly they are snuffed, and your eye leaps back to its original adjustment, then begins another slide and another leap back, and in course of time, lamenting the premature approach of old age, you invest in a pair of spectacles."

But enough of digression. Water, water, is in every one's mouth —just where it ought to be when a man is thirsty; it rains from Heaven, it leaps out of the earth, it rolls about the land in rivers, it accumulates in lakes, three-fourths of the surface of the globe is water, yet there are men unable to be clean. In a great city water, we are told, "is the maid of all work," has to assist our manufactures, to supply daily our sauce-pans and tea-kettles, cleanse our clothes, our persons, and our houses, provide baths, and flood away the daily refuse of the people. A man to be healthy ought to use at least a barrel of water daily, in washing bathing and drinking. Rome, in her pride, used to supply water at the rate of more than 300

gallons daily to each citizen—that was excess. People in small towns have less chance of obtaining the luxury than those in large towns, because they cannot afford water works. They must therefore be content with enough to cook, enough to drink, and enough to wet the corner of a towel. As for bathing, that seems to be out of the question in a country abounding in water; hence one half the dyspepsia of those who, if they washed themselves, would enjoy good health.

Let us go back a thousand years, and look at the Persian aqueducts, attributed to Noah's great grandson,—at Carthegenians, Etruscans, Mexicans,—at what Rome did, and acknowledge that man, in an unripe and half civilized condition, understood that the art of health and comfort was very intimately connected with plenty of fresh water. Look at the savage wherever you meet him, and you will find him a cold water man. Perhaps it is because the savage washes himself so constantly, that civilized people run into the other extreme. One would think that we were all philosophers of the *Platonic* school and deemed the body not worth a thought! True, the temperance men have come to the rescue, so far as regards internal arrangements, but whoever heard them advocating an outside application! According to their ideas, a man, like a steamboat, should draw so many feet of water, and we suppose, have it duly registered on the stern. By the way, is it not wonder that they never thought of electing MAHOMET to the office of Grand Patriarch, when his fundamental principles were "cleanliness and temperance." Well, there is this, at least, to be said in favor of temperance societies—they do not pass the bottle. They don't ask their friends to taste another bottle of that old port, made of doctored elderberry, or try a little more of that sugar of lead and gooseberry, with a body of rhubarb, under the name of champagne. The ordinary manufacture of choice wine for the people requires the following ingredients: for the original fluid, cider, or common cape, raisin, grape, parsnip, or elder wine; a wine made of rhubarb for champagne, to these may be added water. A fit stock having been chosen, strength, color, and flavor may be grafted on it. Use is made of these materials: for color, burnt sugar, logwood, cochineal, red sanders wood or elder berries, plain spirit or brandy for strength. For nutty flavor, bitter almonds; for fruitness, dentzic spruce; for fulness or smoothness, honey; for port wine flavor, tincture of the seeds of raisins; for bouquet, orris root or ambergris; for roughness or dryness, alum, oak sawdust, rhatany or kino.

Of good wine, health requires none, though it will tolerate a little. If we take a glass or two of the pure thing, we may expect a little indigestion. But if the wine is bad, no one can tell to what disorders it may not give rise. As for brandy, whiskey, gin, and other compounds made from corn, they are eminently destructive to life. But as none of our readers drink such villainous compounds, it is not worth while enlarging upon them. As, however, a large number of people drink what is said to be wine, we here insert the TEST of Professor HAHNEMANN, the great chemist of Germany.

HOW TO DETECT ADULTERATED WINE.

One drachm of dry liver of sulphur—two drachms cream of tartar—to be shaken together in two ounces of distilled water, till it be completely saturated with hepatic gas; the liquor is then filtered through blotting paper, and kept in a closely stopped phial. From 16 to 20 drops of this are dropped into a small glass filled with wine. If the wine turn only thick, with white clouds, and deposit only a white sediment, we may be certain that it contains no metallic ingredients whatever; but if it turn black or even muddy, if its color approach to that of a dark red, if it have first a sweet and then an astringent taste, it is certainly impregnated with sugar of lead, or some other impregnation of that metal equally destructive. If, however the dark color be of a blue cast, not unlike that of pale ink, we may expect the wine to contain iron in its composition. Lastly, if the wine be impregnated with copper or verdigris, it will deposit a sediment of a blackish grey color. This experiment ought to be made with a fresh prepared test (which any druggist will put up) in the open air.

As for the makers and vendors of spirits and bad wines, it is impossible to characterize their conduct as it deserves. The night before his death King Richard III. was visited by the ghosts of those whom he had murdered. What a dreadful visitation it would be if a maker or vendor of spirits were visited on his death bed by the ghosts of all those whom he had been the means of sending to premature graves! Doubtless he would feel about as comfortable as did the *Mexican* noble, of whom Bede tells us that on his death bed a ghost exhibited a *scrap* of paper upon which his good deeds were written—then the door opened, and an interminable file of ghosts brought in a mile or two of scroll, whereon his misdeeds were all registered, and made him read them! Fathers killed, mothers broken hearted, children brought up in sin and beggary, would

make up a very pleasant sight for a man, who, in a few hours would be called upon to give an account before his judge! Would not the cries of "justice!—justice, upon the murderer!" boom up from the lowest pit of perdition, and drown the poor wretch's cries for mercy!

But it is not our province to argue out the moral of the cold water question. Our task is merely to place it in a sanitary point before our readers, and to urge upon them as they value health and length of days to use the great renovator daily both outwardly and inwardly. If people must get drunk, let them use strong tea; it is the most harmless intoxicating liquid known. Some people say that its use is natural. LEIBIG says it supplies a constituent of bile. There is no doubt that its popularity arises from its harmless intoxicating properties. But few people, whether women or men, who do not like to made cheerful harmlessly, and whatever sustains cheerfulness produces health. We know very many old ladies, and some young ones too, who keep up the steam from morning till night, and to such an excess that a doctor would pronounce them under the effects of liquor. But we don't know that it does much harm except making them nervous and talkative. Tea should not however, be drunk *hot*, but warm. Hot liquids of any kind weaken the stomach and consequently injure digestion. *Tea* has another advantage over wine, beer, &c., it intoxicates without making fat, and invariably produces jollity! For proof of the latter assertion we refer the reader, if he be married, to a *Dorcas*, or any other sewing bee, where ladies love to congregate. Their idea of *Eden* is a huge tea garden, where the plant is gathered, untaxed by Mr. HINCKS. But what of milk? Is it deserving of no place amongst our drinkables? Certainly. It is the food as well as drink of infants. The infant's appetite is all for milk. Not the city milk made up of chalk, the brains of sheep, oxen and cows, flour, starch, treacle, whiting, sugar of lead, arnatto, size, &c.; (see Mr. Rugg, of London, and Frank Leslie of New York) but good wholesome milk from the country, or from your own cows in town.

CHAPTER III.

FOOD.

We have said above that "an infant's appetite is all for milk"; but art suggests a few additions to that lamentably simple diet. Take up a newspaper and turn to the quack advertisements and you will find a precious list of infant messes, the most conspicious of which are arrow-root, tapioca, sago and starch. These are the preparations which the advertisements tell us, compel nature to be orderly and behave herself.

There is a division of food into two great classes, Professor Croft tells us, nourishment and fuel. Nourishment is said to exist chiefly in animal flesh and blood, and in vegetable compounds which exactly correspond thereto, called vegetable, fibrine, albumen, and cascine. Fuel exists in whatever contains much carbon: fat and starchy vegetables, potatoes, gum, sugar, alcoholic liquors. If a person take more nourishment than he wants, it is said to be wasted; if he take more fuel than he wants, part of it is wasted, and part of it the body stacks away as fat. The correct diet of a healthy man is eight parts of fuel food to one of nourishment. This preserves equilibrium, and suits therefore, an adult; the child, which has to become bigger as it lives, has use for an excess of nourishment. And so *Dr. R. D. Thompson* gives this table. It has been often copied—the proportion of nourishing food is in—

	Nourishment.
Milk—(food for a growing animal)	1 to 2
Beans	1 to 2½
Oatmeal	1 to 5
Barley	1 to 7
Wheat Flour—(food for an animal at rest)	1 to 8
Potatoes	1 to 9
Rice	1 to 10
Turnips	1 to 11
Arrow-root, Tapioca, Sago	1 to 26
Starch	1 to 40

Now, how absurd to give infants farinaceous food; arrow-root, tapioca, and the like; when we give only one part of nourishment in 26. Such diet is like putting leeches on a child, making it flabby and bloodless. A child, up to its seventh year, should be allowed nothing

beyond bread, milk, water, sugar, light-meat, broth without fat, and fresh meat for its dinner when it is old enough to bite it, with a little well cooked vegetable, and in the season a very little of the ripest fruit. Oatmeal and milk, made into porridge, is the best food for breakfast. Under no circumstances should a child ever have *beer*, for not only does it give an appetite for intoxicating liquors, but there is not an ounce of meat in half a barrel of the trash made here. As for comfits, cake, wine, pastry and nuts, they are food for neither man nor beast. Yet when a mother wants her child to be "good" she tempts it with all of these things, and ultimately art secures an ascendancy over nature, giving new desires and vitiated cravings. In time children come to eat garbage as young women eat chalk and coals, not because it is their nature to do so, but because it is a symptom of disordered function. If your children like plain sugar or treacle, let them have it with their porridge, it does not hurt their teeth. Look at the gentlemen and ladies of color down south! Have they not got teeth of the soundest and whitest. Mr. Richardson tells us of tribes among the Arabs of Sahara, whose beautiful teeth he lauds, that they are in the habit of keeping about them a stick of sugar in a leathern case, which they bring out from time to time for a suck, as we bring out the snuff box for a pinch. Plain sugar, we repeat, is good for teeth and stomach, in moderation; but sugar mixed with plaster paris, or chalk, or verdigris, or any other mess, should be kept out of sight and hearing.

As for children of a larger growth, who dine in the modern fashion, all we can say is—they deserve to be dyspeptic. Just think of it—first comes a rich peppered soup almost boiling hot; then fish made indigestible by melted butter, and sprinkled with more cayenne; next meat with all kinds of rich sauces and gravies; next wine, next beer, next pie crust and the indescribable productions of a second course; next celery, cheese and ale, next wine, oranges and almonds, and lastly olives and more wine—and *they have dined!* In other words, they have digged with their teeth another shovelful out of their graves. The hotel that gives the greatest variety for dinner, with the richest cooking, is sure to carry the day. But a sort of retribution always overtakes these asylums for dyspeptics—not one ever appears to succeed, and a rich tavern keeper, we allude to fashionable ones, is about as great a curiosity as a rich miller or lumberman. As for plain mutton or beef, with salt and an appetite, who ever hears of such dishes except amongst healthy country farmers, and mechanics?

There is one and only one way to render even healthy food beneficial, and that is by exercise! Muscular development is by all

means to be encouraged, and the more it is exercised, the more it increases. That it is natural no one can doubt who has watched children at their play. They run, they jump, turn heels over head and cut up all sorts of capers, *a la Blondin*; because nature demands that while the body grows it should be freely worked in all its parts, in order that it may develope into a frame work, vigorous and well proportioned. Don't then, for gracious sake, pin a child down in broad cloth, and subject it to the laws of quiet politeness. Let nature have her way, and your children will be high spirited, handsome and intelligent, and when you send them to school, let the boys and girls go to school together. Oh, my, how very improper! some lady will exclaim. Yes, my dear madame, *very* improper. Nature does some very improper things; for instance, she allows boys and girls to be born in the same family, whereas, if she had the slightest sense of propriety she would only permit one sex to each establishment. Unless you bring up your boys and girls together they will look upon each other as little monsters, and be timid, bashful and awkward in each others society. The English women are celebrated the world over, for their magnificent forms and healthy complexions. These are acquired by constant exercise in girlhood, either at the gymnasium, or in walking, running, skipping or dancing. No fine sense of propriety keeps them in doors, making sickly wall flowers of themselves, but nature is allowed to have her way, and she rewards her disciples with all the graces at her command.

How, dear reader, do you suppose the wife of one of our most *honorable* citizens, in Toronto, obtained her fine graceful form, and charming complexion? Do you think it was by riding in a carriage perpetually, or by walking with her hands pinned to her sides or folded before her, as if she had not a particle of energy. Do you suppose she has spent her girlhood in stitching Ottomans with worsted birds, or knitting purses for an expected lover? No. She has been brought up, like most English girls, in the open air, with plenty of exercise on foot and on horseback, and although she has plenty of carriages and horses at command, you see her walking with her husband along King Street, as if she really enjoyed it. She is, without knowing it, the best sanitary reformer in town, for her example is sure to be followed, and will be attended with the best results.

"But you are off your food!" No, we are not. You are supposed to have dined, and we have been telling you how to digest your dinner. And now, dear reader, farewell. A GOOD DIGESTION WAIT ON APPETITE, AND HEALTH ON BOTH."

Toronto, February, 1860.

P. S.—Those who follow the rules of health above written, will never be troubled by sickness, but as they may have to visit those who follow no rules but their own appetites, we will communicate a few hints for their guidance.

When you enter a house where a friend lies ill, don't put on a face as long as your arm and condole by anticipating evil. While there is life there is hope. Put on, then, a cheerful countenance, and endeavour to raise the spirits of the family. Your bright looks and cheerful conversation will be transmitted through other faces to the sick chamber, and lighten the pains of the invalid. If you enter the sick man's presence, go to him like a ray of sunshine—not like silent thunder. If the room is dark, throw open the blinds, and if the weather be not too cold, the window also. True, by this means you may cheat the doctor out of a fee, and perhaps the undertaker also: never mind them, but remember your duty to your friend. Of all things don't sigh or mope, or do anything to depress his spirits, give him cheerful words and gentle laughter, let him have sunshine inwardly as well as outwardly, and he will find it the most nutritious food he could possibly take. If it is summer time carry him fresh flowers, and after moving the medicine bottles out of sight and smell, put the flowers in their place. Let him have something pleasanter than a lot of powders or phials, to feast his weary eyes upon. Let no slop or mess of any kind, stand for one moment in the room, but see that it is "tidied up" every few minutes, and kept cool, light and comfortable. Let the patient have two beds, one for the day and one for the night, and have the sheets and pillow cases frequently changed. Next to fresh air there is nothing like a fresh wholesome bed. Don't be afraid of your friend catching cold in consequence of all this freshness, there is no danger of that. If you talk of religion don't dose your friend with horrors. Don't tell him he is d—d forever, but rather dwell upon the loving kindness of the Lord,—how he pitieth us as a father pitieth his children, and chastiseth us only for our good. If you want to fortify yourself with arguments read *Plato* on the immortality of the soul, and deliver your views in a cheerful conversational manner like SOCRATES. Don't preach at him or to him, and don't frighten him unless you want to kill him. Should your friend die do not keep the body several days in the house. It is not your friend that lies there, but the earthy part of him; his soul has gone, let us hope, to a better world, and is now only too glad that it has escaped from its prison. Above all things, if there is a cemetery anywhere within a dozen miles, don't bury your dead in the crowded graveyard of a town or city. Take the body where it can do no more

harm in this world, and do not let it be converted into pestilential gases to poison your fellow citizens. Don't fancy that because your friend's body is buried in a cemetery, it will be ploughed up and turned into rotation crops, or that he will be disinterred in the form of wheat, carrots or potatoes!

Finally, let those who want to make their homes healthy, read, mark, learn, and digest the following testimonials in favour of a system of ventilation, which is now rapidly travelling from the Atlantic to the Pacific, and is destined ultimately to spread over the whole continent of America:—

TESTIMONIALS.

Ruttan's Ventilating Stoves.—Health, Comfort and Economy.

These may certify that the Board of School Trustees for the City of Toronto put up December, 1867, in their new School House, on Elizabeth Street, four of Ruttan's Air Warming or Ventilating Stoves, say one in each School Room. These stoves were in regular use, during school hours, until fires were discontinued, about the beginning of the month of May; and they have given full satisfaction in every respect. Although the weather was severe and prolonged, the Ruttan Stoves kept the School Rooms comfortably warm, while the ventilation at the same time was thoroughly good. These Stoves are also very economical in fuel, as is proved by the fact that, the four in question, consumed only two and a half cords of wood each, during the above mentioned period of time.

[Signed.] W. W. OGDEN, M. D.
G. A. BARBER, Chairman Committee,
Secretary, B. S. T. School Buildings.

ADDRESS.—H. J. Ruttan, Architect for the Ventilation of Buildings, Railway Cars and Ships.

Cobourg, September 15th, 1868.

From the Peterborough "Review"

In a rigorous climate like that of Canada the domestic comfort of all, rich as well as poor, depends not a little on the way in which our houses are warmed; in fact, the luxury of proper warmth exceeds both elegance and grandeur. Certainly the most complete method yet invented is the Ruttan. The inventor, Hon. H. Ruttan, of Cobourg, has been more or less engaged in working out his theory for the last twenty years; he has a thorough understanding of what is called pneumatics, and the laws of heat, and has brought this knowledge to the construction of his process of heating houses, churches and public halls. The principle of the theory, shortly expressed, is, a duct through which cold and pure air comes from without, passes into and is heated by the stove, and apertures within the building to allow the exhausted atmosphere to escape, are arranged through the fire place board, or otherwise. We have been using the No. 2 size in our house for some time, and it is giving unqualified satisfaction. Not only does it greatly economize the fuel, and keep equally heated the whole house, up-stairs and down, but by it there is a fresh supply of pure warmed air ever circulating throughout the house.

As a process of ventilation it is an admirable application of natural science. We notice that many of the railways in the United States as well as public buildings there, and in Canada, have adopted the Ruttan air warming plan. For all those who are building homes, we are quite convinced that this method would abundantly repay its possessor both in comfort, economy and a means of health. The patentee much prefers that ah ouse be constructed in view of using his air warmer, though, as in our case, it answered perfectly by merely making a few holes in the fire place boards.

R. ROMAINE,
Proprietor of the Peterborough "Review."

NORMAL, McLEAN Co., Ill., MAY 28th., 1867.

HON. HENRY RUTTAN.

DEAR SIR :—We the undersigned, have during the past winter observed with great care the working of your plan of Warming and Ventilating of houses, as exhibited in the residence of B. R. Hawley of this place, and we are convinced that it is more perfect than anything of the kind extant, and indeed we believe *your system* of Ventilation the *only perfect* plan ever yet discovered, and we earnestly recommend it to the attention of all, and especially to those who have charge of the building of school-houses, churches, and all public buildings.—No man, or set of men, should build any kind of building, designed for the use of human beings, without adopting your system :—

Joseph A. Sewall, Prof. of Natural Science in the State Normal University at Normal, Ill.; Richard Edwards, President of State N. University at Normal, Ill.; Thomas Matcalf, Prof. of Math., Normal, Ill.; Edwin C. Hewitt, Prof. History and Geography at Normall, Ill.; William L. Pillsbury, Principal of High School, Normal., Ill.; J. H. Bull, Physician, Normal, Ill.; G. R. Woolsey, Physician, Normal, Ill.; Emaline Dryer, Preceptress and Teacher of Grammar, Normal University, Normal, Ill.; Edith T. Johnson, Principal of Primary School, Normal University, Normal, Ill.; Wm. H. Bradly, Architect, Normal, Ill.; Geo. Dietrich, Normal; Stephen Pillsbury, Normal; C. G. Bradshaw, Pastor of M. E. Church, Normal, Ill.; L. A. Hovey, Normal, Ill.; E. Barber, Bloomington; McCann Dillon, Physician, Bloomington; W. H. Daniels, Pastor of Congregational Church, Normal; W. H. Parnell, Normal.

From. Prof. Watson, Professor of Astronomy and Director of the Observatory, Ann Arbor, Mich.

Observatory, ANN ARBOR, Feb. 9, 1866.

MY DEAR SIR :—A few weeks since I visited Albion in this State, and had the pleasure to witness the operation of your system of Warming and Ventilation, as carried out in the residence of S. V. Irwin, Esq. The exhaustion of the foul air was most complete, and

the rooms were evenly warmed; and Mr. Irwin assured me that during the extreme cold weather which preceded my visit, the apparatus worked to the entire satisfaction of all the members of his family.

When we consider, in addition to mere warming of the air in the room, the ventilation which is so essential to health and comfort, your system is unrivalled. The large volume of air, moderately warmed, which is thrown into the room, obviates the objection to hot air furnaces as ordinarily used, while the system of ventilation which you introduce makes your system, in my judgment, vastly superior to the modes of warming buildings by steam or hot water.

Very truly yours,

JAMES C. WATSON,

Prof. of Astronomy and Director of the Observatory.

Hon. H. Ruttan, Cobourg, C. W.

From Dr. Haven, Michigan University.

University of Michigan, Ann Arbor, Jan. 19, 1867.

Hon. H. Ruttan, Cobourg, C. W.

My Dear Sir:—Having had good opportunity of seeing your system of ventilating public buildings and residences in all seasons of the year, and of warming them in winter, thoroughly tested, it gives me pleasure to testify that it is altogether the most satisfactory with which I am acquainted. It needs but to be carefully examined to be admired. The ventilation is perfect, and the warming, I think, fully equal to any other system. It has been tried two or three years in the Law Building of the University of Michigan, with universal satisfaction. I commend it to all who are about to erect buildings, or who desire to provide for the ventilation and warming of buildings already erected.

Very truly yours,

E. O. HAVEN,

President of the University of Michigan.

P. S.—Pardon me for delaying so long to write. I thought you intended to write to me, but perhaps was mistaken. Will you please acknowledge the receipt of this.

Yours truly, E. O. H.

From Prof. Wood, Professor of Engineering, Michigan University.

Ann Arbor, Michigan, Feb. 12, 1866.

Mr. H. Ruttan,

Sir:—The occasion of our visit to Mr. Irwin's house was too pleasant and profitable to be easily forgotten. You have laid me under great

obligations to you in furnishing me with the opportunity of seeing your system of ventilation as applied to buildings, in full operation; and I therefore wish to report to you my impression of the system.

The great point in thorough ventilation is—not its importance—for that is admitted by all well-informed persons—but, how shall it be secured. I am acquainted with several systems of ventilation, but it appears to me that yours is the most scientific of those within my knowledge.

The ventilation of Mr. Irwin's house seems to be a complete success. I was highly pleased with the arrangements, and with the practical working. I shall have no hesitancy in recommending the system when the conditions of its successful working—such as, the large shaft; the free circulation under the floor; the perforated base; and a large supply of air to the Air-warmer—are fully complied with

It must be gratifying to you to be assured that you are in possession of a principle which can be applied with ease under a great variety of circumstances. The same general principle enables you to ventilate rail-road cars, residences and public halls.

In view of the importance of the subject, and your success in applying it, you may well be considered a public benefactor.

Yours truly,

DEFOLSON WOOD,

Professor Civil Engineering, University of Michigan.

Samuel V. Irwin, President National Exchange Bank, Michigan, Albion.

ALBION, Michigan, June 19, 1866.

HON. HENRY RUTTAN,

DEAR SIR:—Yours of the 25th ult. is before me. It should have had attention before this, but press of business and absence from home has prevented. I shall be happy to give you such testimonial as you may wish, if you will draw it up and send it to me. I am well pleased in every particular with the institution, and do not think you can draw one so strong, but what I could properly endorse it. I would do so myself but I think you can draw what you want better than myself. Do not hesitate to send it along at once, and I will promptly return it to you.

SAMUEL IRWIN.

DETROIT, Michigan.

To H. RUTTAN, ESQ.

At a meeting of the Board of Managers of the Detroit Young Men's Society, held at their Committee Room, the following resolutions were unanimously adopted:—

Resolved,—That this Board take pleasure in placing upon record their entire approval of Ruttan's system of warming and ventilating. The apparatus having been put in place and adapted to the New Hall, under the supervision of the patentee himself, Henry Ruttan, Esq., Cobourg. Canada West.

Resolved,—That it has not only met our most sanguine anticipations. but has received the universal commendation of the distinguished lecturers and other public speakers who have appeared before the public, as well as the audience in attendance.

Resolved,—That we cheerfully recommend Mr. Ruttan's system as being peculiarly adapted to "public buildings" and feel confident of of its meeting with universal approval.

SIDNEY D. MILLER,
President.
SAMUEL R. MUMFORD,
Recording Sec'y.

[SEAL]

WALTER INGERSOLL,
A. H. DAY,
R. N. RICE,
S. D. ELWOOD.
JOHN G. ERWIN,
CLEVELAND HUNT,
CHARLES DUCHARME.
W. A. MOORE,
GEORGE MCMILLAN,
JAMES E. PITMAN,
LUTHER S. TROWBRIDGE,

Ventilation of Railway Cars.

CHICAGO, April 20th., 1867.

"TO WHOM IT MAY CONCERN."—We the undersigned, Superintendents of Railways, have applied Ruttan's Plan of Ventilation to our Coaches. The large supply of pure air, entirely freed from dust and cinders, and the downward exhaustion which prevents Passengers inhaling each other's breath, are most valuable characteristics of his system, and, in our opinion, render it the most desirable of any yet introduced. We would also bear testimony to the winter arrangement which, whilst it supplies a large quantity of fresh warmed air, effects a very considerable saving in fuel. One stove only being used in each car.

R. N. RICE, General Superintendent Michigan Central Railroad.

J. B. SUTHERLAND, Superintendent Car and Loco. Department, M.C.R.

R. HARRIS, Gen. Superintendent Chicago, Burlington and Quincy R.

A. N. TOWNE, late Gen. Superintendent Chicago and Great Eastern R.

M. HUGHETT, Gen. Superintendent Illinois Central R.

R. HALE, Gen. Superintendent Chicago and Altona R.

R. EATON, Superintendent Car and Loco. Dept. G.T.R. of Canada.

From A. T. Hall, Treasurer C. B. & Q. R, R. Co.

OFFICE OF THE CHICAGO, BURLINGTON AND QUINCY R. R. Co.
CHICAGO, April 18, 1867.

H. J. RUTTAN, Esq.,

DEAR SIR:—Having had occasion for the past year to ride upon our trains between Chicago and Aurora, a distance of forty miles, almost daily, in coaches using your system of Ventilation, it affords me pleasure to state, that nothing more perfect for furnishing a full supply of pure fresh air is desirable.

During the past winter, the coaches seating 76 persons each, were warmed by one stove placed in the end of the car, and were rendered entirely comfortable in the coldest days. To some considerable extent I have observed the working of your plan for Heating and Ventilating buildings, and I have yet to learn of a case which has not proved satisfactory. Yours very respectfully,

A. T. HALL.
Treas. C. B. & Q. R. R. Co.

Certificate from Prof. Kingston, Victoria College, Cobourg.

DEAR SIR:—In reply to your enquiry concerning my views of your Air-warmer and system of Ventilation, I have to say, that my house is of brick, walls hollow, built in the summer of 1859. The house is 38 by 35, and two stories high. The lower rooms are 10 feet between floor and ceiling, and the upper rooms 9 feet. Each room has either a fire-place or an air exhausting flue, Air-warmer No. 1 stands in the lower hall, (no other stove is used in the main building), and is supplied with cold air by a condnit 24 inches by 12, under the floor and connecting with the external air. The whole was constructed under my supervision; and I direct also the management of the Air-warmer.

After testing your system for two winters, the results are—*thorough ventilation, especially in winter, and a warm, bland atmosphere, equally diffused throughout the whole house.*

The winter before last, I burned twelve cords of good hard wood, and last winter being somewhat colder, I burned thirteen cords from the 24th of December till the 11th of May.

I have great pleasure in confidently recommending your system of heating and ventilation, where the building is constructed to receive it, as tending to secure health and economy, far above all other systems with which I am acquainted.

I am, Sir, very truly yours,

W. KINGSTON.

H. RUTTAN, Esq.

Certificate from S. S. Easton, Esq.

EASTON CORNERS.

H. RUTTAN, Esq.,—

SIR:—I have proved them all; not a particle of smoke have I seen in the house. I would not take one thousand dollars to be without this air improvement, our building and the warmer work so well together. All new buildings must be constructed in this way to save stove dirt and firewood, as wood is now getting scarce.

Respectfully yours,

S. S. EASTON.

From J. D. Pringle, Esq., Hamilton.

HAMILTON, February.

I certify that on Christmas eve I had one of Mr. Ruttan's small No. 1 Air-warmers put up in the hall of my cottage, which is about 38 x 28 feet in size on the ground and is divided into four rooms.

The weather having been so very cold, I have not made any of the apertures required in order to adapt the house to this mode of warming, except the cold air duct aperture; however ill adapted as it is at present, its operation is most satisfactory. The whole house is kept at a pleasant temperature, exceeding "Temperate Heat by about 5 or 6 degrees, seldom going above that." I am satisfied that when the proper apertures are all made, the warming of the house will be perfect, in addition to which the ventilation, or circulation of pure air is delightful.

J. D. PRINGLE.

From W. Corrigal, Esq., Cobourg.

I hereby certify that one of Mr. Sheriff Ruttan's Patent Ventilating Stoves was put in the hall of my house, which is 38 x 40 feet inside, and two stories high, on Christmas Eve last; that up to that time I had employed in warming of my house, a hot air furnace in the basement, in which cord-wood four feet long was burnt, two fire places and two stoves, and consumed therein upwards of two cords of wood per week. Since Christmas I have had no fire in the building (except in the kitchen, which embraces one corner of it) but what was made in this stove, and, although the winter has been excessively cold, the thermometer having been more frequently below zero than I have ever known before, yet my house has never been so comfortably warmed. From experiments made, at Mr. Ruttan's request, I can safely assert that about half a cord per week will be fully sufficient, on an average, from November to May, to keep the whole house at a constant temperature from 50 to 65 degrees, by means of this Ventilating Stove alone.

Its operation has been witnessed by many of my friends and is exciting a good deal of curiosity, on account of its extraordinary power for so small a machine, measuring 32 inches long, 18 inches broad, and 27 inches high.

W. CORRIGAL.

From the Rectory at Thornhill.

MY DEAR SIR:—In reply to your enquiries relative to the working of the Air-warmer, I have much pleasure in informing you that it has far exceeded my most sanguine expectations.

This house is a parsonage, built by the Parishoners last summer and fall. I persuaded the Building Committee to permit the introduction of your system of Warming and Ventilation. No Architect was employed, as I planned the house, and superintended the erection of it myself, following exactly, the instructions you gave me by letter The dimensions of the building (or at least the main portion of it, the kitchen, pantry, &c., being an "addition" in the rear,) are forty feet by thirty-two. The rooms are 9½ feet high on the lower floor, and nine feet on the upper, there being four rooms on each floor, and a large hall on the upper floor, which we very frequently use as a sitting room. The house is built of brick, on a stone foundation, with a cellar only under the kitchen.

The house was not finished until long after the time appointed.—About the 10th of November, the plasterers being at work in the house, I put in your Air-warmer, and it was found to be of the greatest service in hastening the drying of the walls, so that on the 12th of December I was enabled to move my family into the house. I had always felt confident of success, but had, nevertheless, taken the precaution to put a small stove into our own bedroom, which would, I thought be the most difficult part of the house to warm. Before we had been in the house three hours, my wife ordered it to be taken down and we have never felt the want of it. The next day the thermometer fell to 18 degrees below zero, and then, and ever since, during the coldest weather every room has been perfectly comfortable. The temperature, however, is not like that of a stove-heated house, but like the genial warmth of a pleasant summer day.

The Air-warmer is No. 1, being the smallest size, which we find amply sufficient. We have found no difficulty whatever in the management. The only point to be attended to, is the out-side slide, which regulates the quantity of cold air to be admitted, according to the direction and force of the wind. But since the first week or two, my servant has attended to this without any instruction from me.

During the erection of the house, many persons expressed their fears that the mode of heating would be a failure; but all who have

seen it in operation now express their admiration, and several who contemplate building, are desirous of adopting it.

I am, my dear sir, yours very faithfully

EDWARD H. DEWAR,
Rector of Thornhill.

Certificate of J. B. Fortune, Esq., Sheriff of the United Counties of Northumberland and Durham.

COBOURG.

I, James B. Fortune, Sheriff of the United Counties of Northumberland and Durham, certify that I have used Mr. Ruttan's "Combined Ventilating Stove, No. 5," during the past winter, and that it has thoroughly warmed and ventilated my house, 50 x 40, and two stories high. It is in my opinion, a great saver of fuel. It is on the same principle as the Ventilating stoves on the Grand Trunk Railway cars—which gives so much satisfaction to the travelling community.

J. B. FORTUNE.

Certificate of Arthur Macdonald, Esq., Agent of Canada Landed Credit Company, &c.

COBOURG.

Having during the past winter tested the value of Mr. Ruttan's Combined Stove, No. 3, as a Ventilator and Air-warmer, in a cottage one and a half stories high, I have no hesitation in saying it has given unqualified satisfaction. I would also add my testimony as one of the travelling public, to the value of the Railway Ventilator.

A. MACDONALD,

From the New York Tribune.

VENTILATION AND WARMING OF BUILDINGS. By the Hon. Henry Ruttan. 8vo. pp. 106. Geo. P. Putman.

More than nineteen years of the Author's life have been devoted to the researches and experiments of which the results are set forth in the present volume. He is evidently a man of original ideas, and at the same time combining no small degree of practical sense with uncommon inventive genius. The plans of warming and ventilation which he proposes, especially in their application to railway cars, have the merit not only of novelty, but of successful operation, as is attested by the statements of several of the leading railroad managers in the United States and Canada. Few subjects are of greater practical importance to the health and comfort of a large portion of the public than that which is here so ably discussed, and Mr. Ruttan has earned the thanks of the travelling community in particular for the valuable suggestions which he has brought forward.

From the Detroit Free Press.

* * * It has been successfully applied upon the cars of the Michigan Central Railroad where the air in the car is entirely changed every four minutes; and we speak from actual experience when we say that the comfort to the passengers has been immeasurably increased. The Young Men's Hall in this city is also ventilated after this system, and for this reason is one of the most pleasant we have ever been in, when filled with people. The entire atmosphere in this large hall is completely changed at the rate of 4000 cubic feet per minute. We cannot speak too highly in praise of the efforts of the author. If his system was generally adopted, it would add not only much to our comfort, but to the prolongation of our life.

From the Journal of the Board of Arts and Manufactures of U Canada.

We find the book to be a plain scientific and thoroughly practical Treatise on Ventilation, and its application to every human habitation. * * * We trust that all who read his book will rise up from the perusal as favourably impressed with the value of his system as we are ourselves.

From the Scientific American.

* * * * A new and beautifully executed Treatise. by the Hon. Henry Ruttan, of Canada, has lately been published by G.P. Putman, of this City (New York.) This book contains much useful information respecting the construction and arrangement of buildings beside Illustrated descriptions of his heating and ventilating system. * * * * Many have heard of this principle, it deserves to be more known than it has hitherto been.

From R. N. Rice, General Sup't., Michigan Central R. R.

* * * * In fact, we have the credit with our passengers for having at last provided the means for *perfect ventilation* during the whole year, and for the *entire exclusion of dust* when otherwise it would be the cause of much discomfort. The adaptation of your plan of ventilation and heating to any cars now in use being easy, and the liability to disarrangement so very slight, renders it worthy the attention of all Railway Managers.

From the American Railroad Journal.

* * * Mr. Ruttan has spent many years in the study of his subject, and brings to its discussion a large experience and much

reflection. * * * * * * * * * * *
The remainder of the volume consists of elaborate explanation of the plates and of particular instructions in the construction of public and private rooms, furnices, stoves, cornices, air ducts, and railway carriages, which we commend to the attention of our readers.

From Appleton's Cyclopædia p. 211, Vol, XIV.

Mr. Henry Ruttan, of Cobourg, C. W., has introduced an arrangement called the Air-warmer, which seems to combine the better qualities of stoves and furnaces, and to be free from their chief objections. * * * * * * * * * * *
The inventor's aim was to secure the cheapness and simplicity of the stove with the ventilating efficiency of the more expensive apparatus, and his arrangement has been very successfully employed in private ings, railroad cars and various public institutions.

APPENDIX.

SIR,—As letters requesting information about my Air warmers are coming in upon me much beyond my ability to answer by writing, you will excuse my sending you a printed statement; and you will confer a favour by communicating to those, who you may think require it, the information contained therein.

Those who have a taste for and wish to understand the whole subject of ventilation philosophically, will find the subject treated at large in my Book on "Warming and Ventilation," sold by

PUTNAM, the publisher New York.
BREED & BUTLER, Buffalo.
ELWOOD, Detroit.
ROWSELL, } Toronto.
CHEWETT, }
DAWSON, Montreal.
HOUSE, } Cobourg,
ALLEN, }
GRIGGS, Chicago.

WITH REGARD TO A NEW BUILDING:

The Ventilation must be begun with the foundation, or it can never be properly done. Hence the necessity of employing no Architect who does not understand Ventilation. The cost of building for Ventilation is very little, if anything more than without it, and then, when it is properly done, you will be healthy and comfortable in your house; and that too, at about *half the expense for fuel* that you will be at in any house built upon the old plan.

TO THOSE WHO ARE ABOUT TO BUILD:

Considering that the proper warming and ventilation of dwelling and school-houses is of vast importance; considering not only the first cost, but the never-ending expense in pulling down, cleaning and resetting the hot air furnaces now in use, at least once a year; and also the enormous expense of fuel required, and above all, the

destructive effects of the over heated air in a family or a school room full of children ; and considering that, most probably, several generations will inhabit the building, I say considering these things, is it not worth while to, at least, take the trouble of *thinking* a little before we begin our dwelling or school house? This is all I ask.

Your building must have *lungs put into it*, and this can only be done *whilst it is building*. It is too late afterwards. This can be done and your house warmed and ventilated for half the expense of heating it by means of the usual hot air appliances, and then afterwards, you will have the satisfaction of keeping your house healthy and warm with half the expense for fuel of the old plan. This, I know you will agree with me, is worth the trouble of thinking and enquiring about. You *will then employ no Architect or builder who is not competent to advise you properly in this all important matter*. I hope before another season to have the assistance of others so scattered in various localities throughout the provinces, and United States, that a a more ready access may be had for advice and instruction. In the meantime, however, I shall at all times be most happy to answer inquiries, and to give advice to all persons about to build, or who wish to adapt an old building to ventilation.

When you build a new house, in this cold climate, you should not have an open stairway to go up stairs by, but a CLOSE HALL ; and take particular notice that it takes more than double the quantity of fuel to warm your room or rooms that are 12 feet high than if they are only 9 feet high. No dwelling house in this climate should be more than 10 feet between joists. Every body knows that you can no more get *two* quantities of air *into* a house by its own natural action than you can two quantities of marble. The first thing therefore that you have to do whether you have an old or new house, is to provide *means to get the old and cold* air, that is already in your house, *out of it*, and the only way that I have ever found to do this is by means of chimnies, or exhaust shafts.

Where you have no brick or stone chimnies to exhaust the air, *wood* will answer, except for the smoke pipe, just as good a purpose. Take good seasoned-matched inch, or three-quarter inch boards and build up the sized flue you want from the first floor upward, carrying the top out. of the roof 6 or 8 feet above the peak of the roof. Make a sliding valve at the bottom of each room to be warmed so that you may close it when the room is not required to be warmed. The top of this wooden chimney may be finished off like the common Emirson ventilator.

No. 3 Combined, is a handsome hall stove as well as an air warmer well adapted to warming of Libraries, offices, and school rooms, and if it be required, may, with an additional expense of five dollars be made a capital cooking stove ; price $45.

No. 4 is adapted to the same work as No. 3, except that of cooking ; price $30.

No. 5 Combined, is adapted to perform the same work as No. 3, but will do at least three times the work ; indeed it is the most powerful house warmer ever constructed ; price $75.

No. 6 is my basement air warmer ; price $250.

A school-house, like any other building requires to be *built for* ventilation ; but nearly all our school-houses, already built, may be adapted to it at the mere cost of a chimney. This chimney, in a building not more than 30 x 40 feet, and nine feet high between joists, (and no ventilated school-house should be higher than 9 feet,) will require a chimney flue of 2 feet, if larger than 40 feet the size of the flue must be increased in proportion) and this flue must be begun at least one foot *below the bottom of the joists* or sleepers, (two feet will be better) and carried out at least six feet above the ridge of the roof. Besides there must be a good air-tight wall of stone, brick or wood all around as a foundation wall, and there must also be left a clear space of not less than six inches under the whole building between the bottoms of the joists and the ground. Likewise the windows of the north and west sides should be made double not only in school-houses but in dwellings. Then you must bring in under the floor by a stone brick, or wooden duct for the small No. 1 warmer 2½ ; and for the No. 2, 4 feet ; for No. 3, 1 foot ; for No. 4, 1 foot ; for No. 5, 2 feet of fresh air—in all cases the air must be brought *from the north or west side of the building* to directly under where the Air-warmer is to stand. The duct must be perfectly air-tight, and must, of course, where there is no basement, be laid down before the floor is laid. It had better be underground altogether, (and made of brick, if possible) and then be brought up to the floor where the Air-warmer is to stand. Or should you have an old school-house, where you cannot get fresh air *under* the floor, it may be brought in *above* the floor, and under an air-tight box six inches high and four feet square, and the Warmer may be set upon the proper aperture made in the top of this box. For the No. 3 and No. 5 the air may be taken down into the back and through the wall without any "box under the stove."

No Hall in the dwelling should be less than eight feet wide and the Air warmer should be set in or near the centre, and a clear

passage left around it, and where it cannot be set in the centre the stove may be set on one side.

I do not allow any of my Air-warmers—of which I have six kinds—to be sold for use in a house already built, unless I am informed upon the following points, viz:—

1st.—The size of the house on the ground.

2nd.—The number of stories and their height.

3rd.—The number of chimnies, and the size of their flues, as nearly as can be ascertained.

4th.—The width and situation of the hall or halls.

5th.—The height of the cellar or basement to the bottoms of the overhead joists or sleepers, and whether under the whole house, or if not, under what part?

6th.—To what point of the compass, or nearly what point the house fronts.

7th.—Of what material built.

A rough pen or pencil sketch of the basement and each story will give all the information which I want. You need not make it to a scale—mere figures to give the different sizes will be quite sufficient.

Besides this large Air-warmer, or basement heater, I have five smaller ones of different sizes (see views of them.) These I have got up expressly for halls of dwellings, school-houses and offices. They may be set in the hall or up stairs, or in any apartment.

The small No. 1, only takes up room on the floor of 32 by 18 inches, and requires 2½ feet of air to be brought under it. It will thoroughly warm and ventilate a school-house of 30 x 40 feet, or any ordinary sized cottage having two good chimnies in it, and will change every particle of air in the building at least once every half hour; price $50 at the foundry.

The No 2 Air-warmer takes up room on the floor 46 x 26 inches will do double the work that No. 1 will do and will thoroughly warm and ventilate any compact built dwelling house two or three stories high; price $75.

These Air-warmers are the result of twenty years experimenting for the purpose of economising fuel and ventilating buildings. And how far they are entitled to the confidence of the public I will leave to those who have them in use to show by the testimonials on pages 23 to 33, being among those I have more recently received.

All these prices are at the foundry.

LATE IMPROVEMENTS.

These Air-warmers and Ventilating stoves having during the last twelve months been greatly improved by the introduction of *tubes* which very much increase their heating power, are now offered to stove manufacturers and the public, and are warranted to be the best medium known for heating and ventilating dwellings, schools, churches, and all other buildings, public and private.

The Air-warmers and the ventilating stoves have different capacities. The Air-warmers have double side plates and are better calculated to infuse warmth into a whole building than the ventilating stove which while it will do all the work of a common stove in heating the room or locality in which it stands, will also warm the adjoining apartments. The ventilating stove is, therefore, best for the hall of a dwelling, or for a school house where an active heat is required to be felt immediately upon entering the building. The ventilating stove, whilst it has every attribute of the common stove in giving out an active heat in its immediate vicinity, will also change the air in the building only in a little less degree than the Air-warmer.

All my warming machines require fresh air from the outside to to be brought to them, and therefore it will be best for me to explain as shortly as possible the usual mode of doing this.

SETTING RUTTAN'S HEATERS.

Supposing that you require your machine to stand in the main hall of your house, a box air duct must be made of the proper length and capacity. This duct will be probably best made of inch pine, well seasoned boards, and matched together air-tight. Then a hole is made in your cellar wall—one end is laid in the aperture and the other is fastened to the joists exactly under where the stove is to stand in the hall. Then a hole is cut through your floor and a good air-tight connection is made between the duct and the stove. This connection of the air-duct and the stove or Air-warmer may be made in another way, and by some it is said to be the best. Run a wooden duct strait through the basement of your house, hanging it to the

joists—set the stove or Air-warmer directly over it, and then cut through the hall floor down into the duct. Leave both ends of the duct open—outside the cellar walls of course.

This wooden air-duct must of course be of sufficient size to carry the quantity of air which you require. It matters not what shape you make it so that it will carry the quantity you want.

I cannot do more here than merely give an outline by which you may be guided in setting these machines in operation. If you wish to go fully into the subject of ventilation and warming, send and get a book: "Ruttan on Ventilation and Warming," which you will find in the principal bookstores.

In connection with the fresh air duct it is necessary further to explain that as it is important that the air should be kept on during all the time that the fire is kept up, so it is important in very cold weather that it should be shut off during the night or when the fire is gone down. For this purpose, when your duct has but one end open, a single valve to shut off the air only is necessary, but where you run the fresh air duct *through* the building and the air comes in at *both* ends, you must of course have two valves, one on each side of the Air-warmer or stove. These valves or slides should of course be put in the duct at the most convenient places to be handled.

I intend to confine this memorandum of directions within the very narrowest limits; but there is such a lamentable ignorance upon this subject generally, and amongst architects and builders, that I cannot help even here to allude to a very few matters which although appearing to some as of trifling importance are nevertheless of great concern to every man, woman, and child in this cold climate.

First.—I advise you never to build or take a dwelling house where the stories are much over ten feet high. You will in a house twelve feet between joists, consume double the quantity of fuel that you need in one of ten feet! The ventilation too is much more efficient in the low room than in the high one.

Secondly.—Never build or take a dwelling with an open stairway, for then you are often obliged to provide fuel for two stories when you need only one.

Thirdly.—Never take a house without *two* outside doors. See that one or both are hung so as to swing *outward*, and avoid as far as you can having both open *at the same time.*

Fourthly.—Even your *inside* doors, as they will naturally close toward the warmest apartment should be hung so as to open toward the coldest.

A close Hall, double windows, (especially on the north and west sides of your dwelling) and good springs to your doors will go a long way in saving fuel. He must be a stolid man indeed, who will pay as much rent in this cold climate for a dwelling having an open stairway, as he would for one having a close hall.

In every case of using one of these Ventilating Stoves you must have a good Dumb Stove in the next story above it.

N. B.—It will be observed that the several prices mentioned are in Canadian Currency.

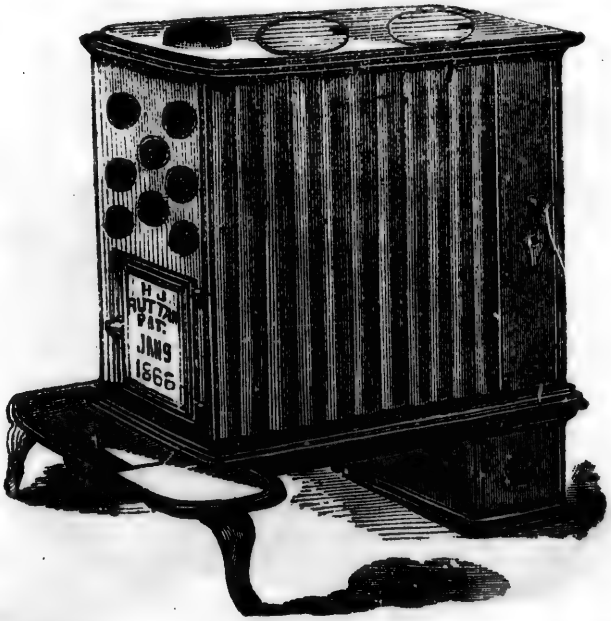
I hereby warrant that the Air-warmers and Ventilating Stoves herein represented will infuse more warmth into a certain space, at the cost of half the fuel, than can be done by any other known means of warming.

H. RUTTAN.

No. 1, House. Price $50

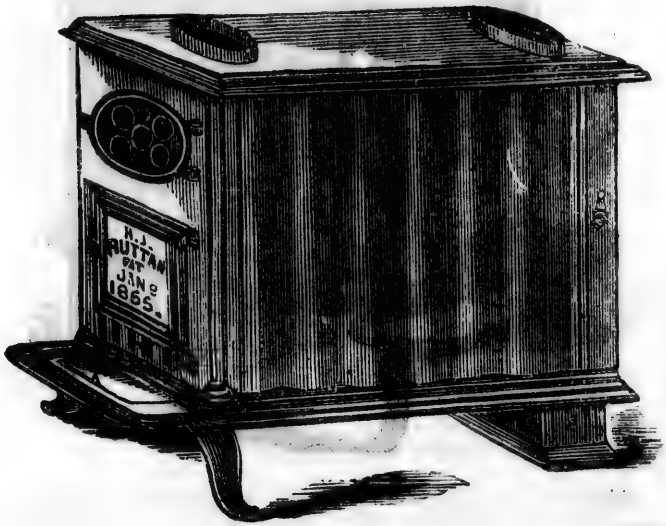
No. 2, Air Warmer. Price $75

No. 3, Ventilating Stove. Price $45

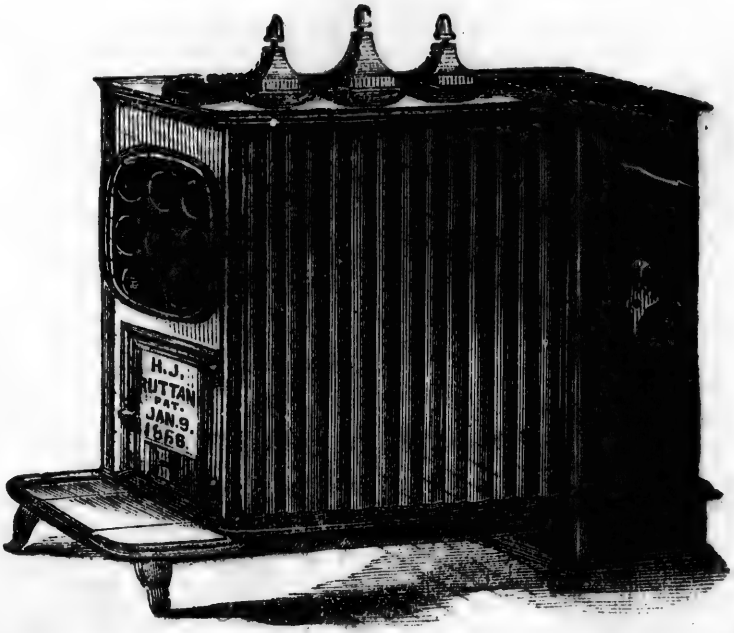


This Ventilating Stove is the most convenient Hall Stove for an ordinary two story house in the world. It requires 200 inches of air.

No. 4, Air Warmer. Price $30.

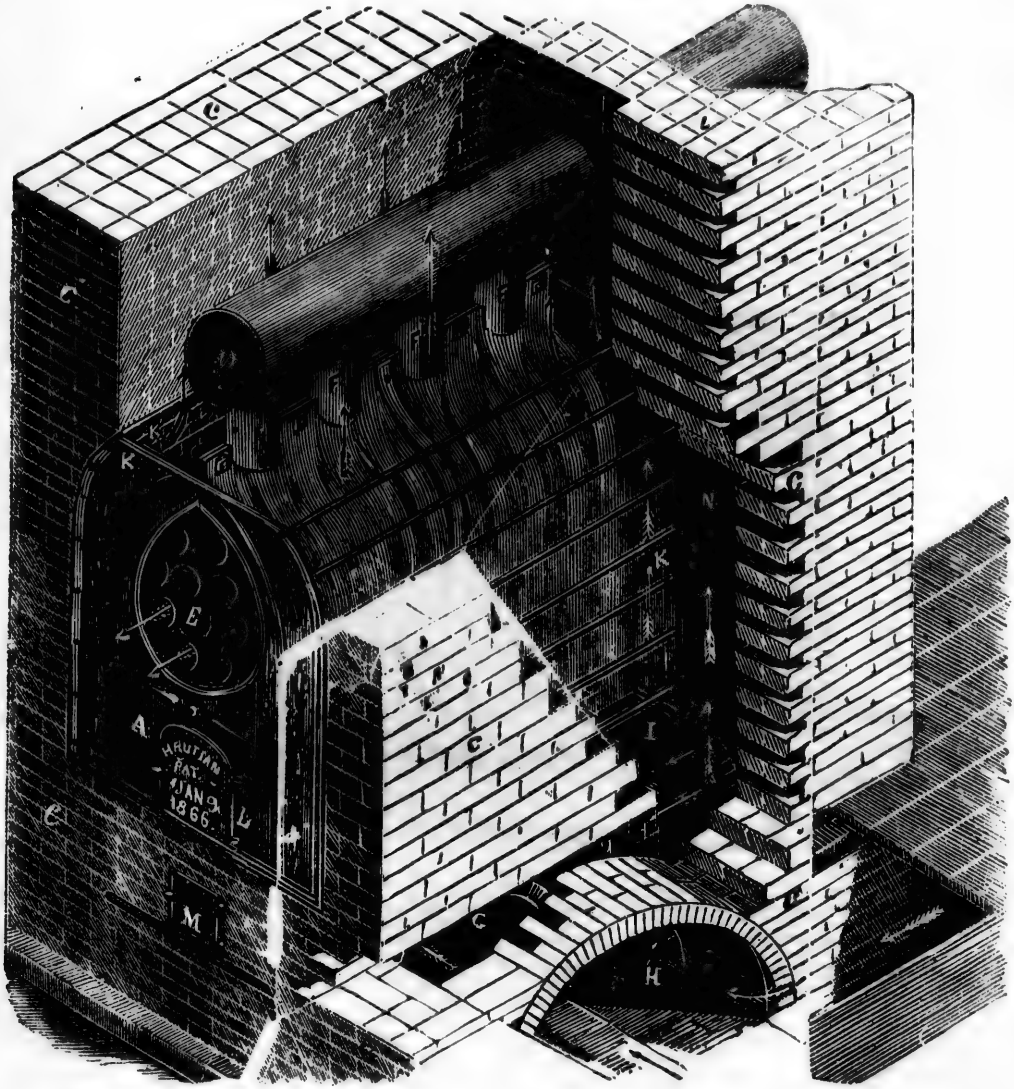


No. 5. Price $75



This Ventilating Stove is the most powerful house warmer of its size, cost and expense of fuel, in the world. Will warm any two story dwelling. Requires 200 or 300 inches of air.

No. 6. Price $250



You will at once perceive that this is set in brick, and must, therefore, be set in a basement or cellar. It will warm an ordinary sized church, provided it is not too high in the ceiling, or a gaol, or asylum, or other public building. It requires for its supply eight feet, or 1152 inches of air.

ADDENDA.

NOTE.—While it is undoubtedly true that the RUTTAN System of Ventilation can be most effectually introduced into buildings while in process of construction, yet I have been very successful in re-arranging and adapting buildings—both public and private—for warming and ventilating upon our plan. You can have your buildings fitted for this system, be they old or new, and no man should rest content until all his friends are thus secured the breathing of *pure air* in their dwellings, *day and night.*

CERTIFICATES.

From President Sewall, Normal School of Illinois.

THE RUTTAN SYSTEM.—These simple principles above referred to, are those on which Hon. H. Ruttan's system of warming and ventilation is based. These are the simple conditions observed. Cold air is admitted in abundance to the "Air-warmer," where it is *warmed* (not heated *red hot*, and its life-sustaining qualities vitiated,) then rises, and is diffused through the room, or rooms, by means of transoms near the ceiling; while the cold air, being heavier, falls to the floor, and escapes at or near the bottom of the room, passes beneath the floor, and is collected into the foul air shaft, and escapes into the outer air.

Still, it is the almost universal practice to set furnaces, and provide hot air pipes to conduct the heated air *into* a room, and make no provision whatever for the air to get *out* of the room, and, in most cases, no cold air duct is provided to supply air to the furnace; and yet men expect to force a current of hot air from such heaters into a room, and effectually warm it. Let anyone *think*, only for a moment, that all rooms are *always* full of air, of some kind, and then remember that it is *just as impossible* to put *two quantities of air into a room at the same time, as it is two quantities of any thing else*, and a man would be just as sensible, who should try to force twice as many cubic feet of marble into a room as there were cubic feet of space, as he would be

who tries to force hot air into a room already full of cold air, without first providing for the cold air to go out. To illustrate: the writer, only a few days ago, was called to visit a large church, designed to seat one thousand people, which, it was said, was arranged for ventilation. And, upon examination, it was arranged to be heated by four furnaces, and it had some eight or ten ventilating shafts or chimneys, expected to exhaust or take the *air out* of the building, *but not one inch of opening was provided to take air in.* But the furnaces were to be set in the basement lecture room, and then take the air from that room, and heat it, and send it up into the main audience room, and o[illegible] doors through the chimneys.

Mr. Ruttan has demonstrated by experiments, during the last twenty years, and at an expense of over $30,000, that there is no way to get the impure air out of a house except by chimneys, or upright shafts, and admitting the air into them at the very bottom. He has perfected a plan to effect this result, which is simple and cheap, and when put into the building as it is being built, costs actually little or nothing more than to build the house the ordinary way without providing for ventilation. His plan is to take the air into one central apartment, usually the hall, through the "Air-warmer," and then pass it from it to the adjoining rooms through registers or transoms, at the top of the room, over the doors, and thence downward and out at the bottom through an open base board, under the floor, and thence into the chimney. By this arrangement we avoid all currents of cold air *over the floor*, as in the case with stoves, and keep the floor always warm varying only some four or five degrees from the temperature at —say *five feet* above the floor; while in any ordinary room, w[illegible]med in the ordinary way, the thermometer will show a differen[illegible] [illegible]ten of thirty degrees.

In a room thus ventilated, the air can not be impure, because as we have before stated, the carbonic acid exhaled from the lungs, being heavier, falls to the lower part of the room and escapes, while pure air from without takes its place. Here, then, we have a perfect system of ventilation. We secure a complete supply of pure warmed air, but without strong currents being established; while the impure air flows out continually. Another great advantage gained by this plan is the *equality of the temperature of the air.* Actual experiment shows that there is not more than 5 deg. Fahrenheit difference between the temperature at the ceiling and at the floor; while in a room warmed by a stove, the difference is from 20 to 45 deg. Fahrenheit.

This plan of passing the foul air out, at or near the floor, is emphatically new. It is an idea which has completely revolutionized the old systems of ventilation. The purest and warmest air is always at the top of the room; while the coldest and most impure is always at the bottom. If we make an opening at the top of the room, the purest and warmest air will escape, if at the bottom, the coldest and most impure air will escape. It would seem that it is not difficult to determine which of these two plans is the sensible or true one. It scarcely seems necessary to claim more for this system. If pure air is so absolutely essential to physical well-being, and if we can adopt any means, however expensive, to secure it we might rest satisfied. But it is far from being expensive; while, on the contrary, a building,

whether large or small, can be constructed as cheaply with such provision for ventilation as without it; and can be warmed at much less expense than by any other plan. The cost as compared with that of heating by steam is less than one-third, as I have clearly demonstrated by a series of careful experiments and observations. As compared with ordinary hot air furnaces, not more than one-half. As compared with ordinary stoves, it is decidedly less. In short, this system seems to possess every possible advantage. It is simpler, cheaper, and, best of all, it gives what is so much needed—a full, complete and constant supply of pure air; and I honestly believe, that when this system is generally adopted in our country, the rates of mortality will indicate a marked decrease.

J. A. SEWALL.

President of the Illinois State Normal School.

CHICAGO, ILL., Sept. 28th, 1868.

W. A. PENNELL & Co., Gents:—I am highly pleased with the working of the Ruttan Ventilation in my house. The air is pure and pleasant, and my rooms are evenly and delightfully warmed.

Yours, &c.,

M. HEATH,

(*Firm Heath & Milligan.*)

DEXTER, MAINE, October 1st. 1868.

W. A. PENNEL & Co., Normal, Ill.:—I have both my house and office warmed and ventilated on the Ruttan plan, so far as it is possible in buildings not originally constructed with reference to the system. It is all I can wish—more than I had ever hoped—in the way of ventilation.

I have a full and complete supply of pure air, my rooms are perfectly warmed, while the amount of fuel consumed is less than one-half I have used on the old *bad* plan.

Sincerely wishing you success, I am, very truly yours,

JOSIAH CROSBY,

President State Senate.

NORMAL, ILL., May 28th, 1868.

MESSRS. W. A. PENNELL & Co.—Dear Sirs:—Yours of May 14th is before me, asking my opinion of "Ruttan's System of Warming and Ventilation." In reply, I would say, it is, in my opinion, a God-send to mankind. The ventilation is perfect—as much so as respiration, and upon the same principle. I use it in my house; and would much prefer a house costing $1,000 with it, to one costing $10,000 without it—that is for my own use.

Yours truly,

JNO. A. BELL, M. D.

MINNEAPOLIS, MINN., Feb. 10th, 1868.

MESSRS. W. A. PENNELL & Co.—Gents:—This morning the thermometer was 36 degrees below zero. Your Air-Warmers in the South Minneapolis school house, one hour after the fire was made, had every part of the house comfortable. The house accommodates 250 pupils. During the day every pupil and teacher in the building was comfortable, except in one room, which, for about half an hour, was too warm; but by closing off the heat a short period, its exhaustion was so complete that its temperature became delightful and pleasant. The janitor informs me that, for the day, he burned one-fourth of a cord of wood in the two Air Warmers of this house. In another school building in the city, accommodating 750 pupils. during this same day, where there are four furnaces, manufactured by other parties, in which the janitor informs me he burned 1½ cords of wood, we could not make the pupils nor teachers comfortable. We are fully convinced by this and other previous experiments, that your Air-Warmers and System of Ventilation are superior to anything in use.

Very respectfully,

A. S. KISSELL,
Superintendent of Public Schools.

MINONK, ILL., May 25th, 1868.

MESSRS. W. A. PENNELL & Co.—Gents:—My house in this place is warmed and ventilated on the Ruttan plan; and, from my experience with it during the past winter, I would cordially recommend it to all about to build. There is only one fire to tend—and that in the cellar—to warm the whole house; and as for saving fuel, I can keep my whole house warm constantly with no more fuel than would be necessary to heat my sitting room and parlor alone, in the old-fashioned way, with stoves.

C. H. WHITAKER.

BLOOMINGTON, ILL., May 19th, 1868.

W. A. PENNELL & Co.:—Your favor of the 15th instant, asking for facts in reference to "Ruttan's System of Ventilation and Warming," as it works in our new school house, is before me; and in answer, allow me to say—first: I am happy to answer questions in this regard. for the reason that the sooner we learn and act upon the great principles of ventilation and warming, the sooner shall we commence to live upon pure air in our houses, school rooms and churches. Mr. Ruttan has the honor of being the first man to understand, adopt and promulgate the true system. When once understood the "System" is perfectly simple; and a mechanic who understands it, can not make a mistake in applying it to a building. This system of warming and ventilation is excellent when applied to and used in a private residence; it is almost indispensible in a modern church edifice; but it is in the school house, where all our children

live and breathe from four to six hours per day, that it becomes a real blessing. In our First Ward building the air is completely renewed and absolutely changed every twenty minutes. The rooms are literally flooded with warm, fresh air through the furnaces—or registers leading therefrom—and the air in the room pressed out through the open base into the foul air duct, thence to the base of the foul air shaft, and from thence upward 70 feet into mid-air, where it can become pure again by association. Our new house will accommodate 600 pupils. We use four furnaces, and have run them since September until now. The cost of heating is no greater than, if as great as, by the common stove. One janitor attends the four furnaces, and takes care of the whole building, with the assistance of a small boy (his son)out of school hours.

With the facts above set forth, I must close this hastily written letter. Wishing you great success in the introduction of this great blessing to the public, I am,

Your obedient servant,

W. M. PACKARD,

President Board of Education, City of Bloomington.

MOLINE, ILL., October 19th, 1868.

W. A. PENNELL & Co.:—The Ventilation and Air-Warmer put into my house by you works first-rate, and I am satisfied it is the most complete arrangemement for heating houses I have ever seen.

JOHN DEERE.

We also refer to the following parties, who are now using Ruttan's apparatus and Ventilation:—

PRIVATE RESIDENCES.—H. G. Harrison, Minneapolis, Minn.; Wm. M. Harrison, Minneapolis, Minn.; M. Heath, (Heath & Milligan) Chicago, Ill.; Dr. J. L. R. Wadsworth, Collinsville, Ill.; N. Sherwood, Aurora, Ill.; E. Y. Griggs, Ottawa, Ill.; W. Bushnell, Ottawa, Ill.; A. T. Purviance, Hennepin, Ill.; W. H. H. Holdridge, Tonica, Ill.; John Deere, Moline, Ill.; W. R. Baldwin, Delavan, Ill.; E. H. Goulding, Alton, Ill.; R. C. Smith, Omaha, Neb.

PUBLIC BUILDINGS.—Three School Houses, Decatur, Ill.; One School House, Bloomington, Ill.; One School House, Collinsville, Ill.; One School House, Moline, Ill.; State Agricultural College, Ames, Iowa.; Several churches in Bloomington, Muscatine, and other towns in Iowa and Illinois.

Don't forget that by keeping all *outside* doors and windows *closed*, the ventilation of your house will be *more perfect*. In winter, more *even heat* and *better air*. In summer, *pure air*, and *no flies* or *insects*; and a room may be lighted up as brilliantly on a July evening as in January, and no bugs or millers about your lights.

We invite attention to the following letters of recommendation from those using my system of Drying, as put in by Messrs. Pennell & Co.:—

CHICAGO, Jan. 25th, 1870.

MESSRS. W. A. PENNELL & Co.:—After a most thorough and complete trial of the Ruttan Ventilating process introduced into our laundry rooms by you, it affords us great pleasure to be able to state to the public that we are more than pleased with the application; and we would say that we have been using the best arrangements for the purpose of drying that we could obtain, and notwithstanding we had succeeded in economizing both time and fuel, yet we most heartily acknowledge that your mode of drying is much superior to any plan we had heretofore adopted, to the [illegible]nt that *we are now drying clothes in one-half the time, and at less t[illegible] [illegible]n one-half the expense formerly required.*

You are at liberty to show any parties our drying rooms in full operation.

Very respectfully yours,

GAGE BROS. & WALTERS,
Proprietors Sherman House.

LEAVENWORTH, KAN., Jan. 11, 1870.

MESSRS. W. A. PENNELL & Co.:—Gentlemen—We take great pleasure in stating that the "Ruttan System," introduced into our dry house by you in October last, has given the best of satisfaction. We had tried various plans suggested to us by other heating and ventilating men but utterly failed to accomplish the desired result; but with the Ruttan System *we can dry clothes, sheets, and table-cloths, in from 3 to 7 minutes*, and would recommend this system to all wishing a good dry house or thorough system of ventilation in public or private buildings.

Yours respectfully,

J. S. RICE & Co.,
Proprietors of Planters House.

On Ruttan's Principle.

NORMAL, ILL., Feb. 5, 1870.

Having had some experience in the Dryin of green oak lumber 3 x 3½, in Messrs. W. A. Pennell & Co.'s dry kiln. I can, without hesitancy and with much pleasure, on account of safety, economy in fuel, and its effectiveness in rapidly drying, recommend it as an improvement that will give satisfaction to all who may try it.

E. W. BAKEWELL.

The Ruttan System Again

CHICAGO, Jan. 31, 1870.

MESSRS. W. A. PENNELL & Co.—Gentlemen:—We are pleased to say that your "System of Ventilation" put in our laundry is working successfully. It is a great improvement upon anything of the kind heretofore in use. Indeed, we believe it the only true plan. *We find our clothes much sweeter, and the dry room pleasanter. We dry in less time, and with very much less fuel.*

You may feel at liberty to refer parties to us, or show them our laundry when you please, for it speaks for itself.

Your suggestions in regard to the arrangement of hanging the clothes, although not at all connected with the ventilation, are valuable, and have saved us $100, and at the same time are much the most convenient.

Wishing you success, yours, etc.,

ROBERT HILL,
Proprietor Matteson House, Chicago.

OTTAWA, ILL., April 10, 1869.

MESSRS. W. A. PENNELL & Co.:—In my hop house I put the hops 15 inches deep on cloth shelves; heat up gradually for one hour, then let the heat up to 140 degrees, and keep it thus from four to six hours; then let it cool off a couple of hours. It is not necessary to stir them, as in the old way, so we save the hops perfect in shape, and preserve all the flower. It only takes four bushels of coal for twenty-four hours. I did not use as much fuel in a week as they would the old way in a day with the old method of ventilation. There is no method this side of the hot place we read of by which they can get up and maintain so even a temperature. The labour is only to put on the hops evenly, make your fire and mind your thermometer. You are not obliged to go in the midst of the heat and stir or turn them all over two or three times, thus breaking the hop and losing the *lupulin* or flower.

Yours, etc.

H. W. HOPKINS.

The Ruttan system for Wool.

CHICAGO, Jan. 18, 1870.

TO WHOM IT MAY CONCERN:—This is to certify that I have in use at my manufactory, on Front Street, near Halsted, for drying wool the principle known as "Ruttan's Patent Dry House," and that after experimenting with steam pipes and hot air, recommended by parties in this city who pretend to understand their business, I find the adoption of Messrs. W. A. Pennell & Co's plan to be more satisfactory and efficient than any other yet I have yet tried. The statements set forth in Messrs. W. A. Pennell & Co's circular are in no way exaggerated. *Their theory stands the practical test.*

J. C. PARSONS,
Office, 38 S. *Wells Street.*

H. J. RUTTAN'S

PATENT DRY HOUSE,

ON THE RUTTAN PRINCIPLE OF EXHAUSTION FOR DRYING MALT, GRAIN, LUMBER, HOPS, FRUIT, TOBACCO, OR FOR LAUNDRY PURPOSES, ETC., ETC.

THIS Dry-house is constructed upon a new plan, and entirely unltke any thing of the kind in the United States.

In fact, it literally *inverts* the ordinary plan.

I take the warm air into my building at the *top*, and let it out, charged with moisture from the material to be dried, at the *bottom*.

By this means I always have the hottest and driest air passing *into* the room or kiln, and the dampest and coldest air passing *out*.

I throw a current of air into the building sufficiently large to fill the house in from three to ten minutes, and at any temperature desired.

By actual trial in a Hop house built by Dr. H. W. Hopkins, on his place at Ottawa, Ill,, this fall, it is found that hops dry perfectly, without stirring at all, in two hours, leaving the color almost unchanged; when, by the ordinary plan it requires from two to three days to do the work, and constant care lest the hops should be over-heated or steamed too much.

All, by a little thought, will see the reason for this wonderful gain in time, and that is, that by the *downward flow* of the warm or hot air the moisture easily and naturally falls to the floor or through the material to be dried, and by the rapid change, or taking in and out of a large body of warm air, moving ten or fifteen feet in a second, I carry off the moisture, as it is done by a strong wind passing over any thing to be dried in the open air on a hot day in summer, only I can do the work quicker than can be done in the open air on the hottest of days; because I can send the air through the house at a temperature of 200 deg. Fahrenheit, if I choose; and as the air is constantly changing, it is always fresh, and imparts no colour to the material being dried, any more than a summer breeze.

It is only necessary to add—

1st. So sure as damp, cool air, is heavier than warm or hot dry air

so certain it is that this system must revolutionize the dry-kilns and dry-houses of the world.

2nd. It is equally certain that it will do better work, and do it cheaper than any other.

3rd. It removes all risk of burning up, either the material while drying or the building, as is so often done; and a dry-house on this plan, filled with material of any kind, can be insured against fire as well as a dwelling house, and at like rates.

4th. From the rapidity with which this system works, twice the work can be done with a building of any given size that can be done by any other system.

I would ask the particular attention of malt men to my new Dry-house. It will supply a want long felt by them; something better than they now have to dry their malt. At present only hard coal can be used. With my Dry-house, I can use any material that will make heat—chips, cobs, soft coal—in short, anything that will burn; and I believe the cobs will dry all the corn shelled from them. The drying of malt can be done in less than half the usual time, and dried so that the malt will be in better condition for grinding; not hard outside and soft in, but evenly dried. No steam will gather in the drying room. You will be able to enter it at any time. As *now* constructed and used, there must be plenty of windows that can be thrown open to let the steam escape, so that men can enter and stir the malt. With ours, the malt will need no stirring, and no extra windows are needed.

Examine my principle in its application to your business; it will save you thousands upon thousands of dollars.

Every Lumberman, every owner of a Malt House, or Grain Elevator, every Furniture-maker, every Laundry-man, every Tobacco-raiser, and every body else who wants to dry any thing cheaply, well and and quickly, must come to this plan.

Correspondence solicited, for details and explanations.

Agents to introduce my Dry-house, treated with on liberal terms.

Address,

H. J. RUTTAN,

Architect, &c., &c., Cobourg, Ont., Canada.

DIRECTIONS

FOR USING RUTTAN'S AIR WARMERS IN CONNECTION WITH RUTTAN'S VENTILATION.

A WORD ABOUT CONSTRUCTION.—Let every body remember that to economize fuel in simply *heating* a building, a *slow* combustion is *always best*, and it is therefore, wise to buy a stove or "Air Warmer," a size larger than most persons think necessary, and then keep a large quantity of fuel in the fire-box, so that with the dampers all closed, it will burn slowly and still give sufficient heat. By so doing a more uniform temperature will be obtained.

1*st*. A large "Air Warmer" will last better for *five* or *ten years*, than a small one will *one* or *two*, and do the same work.

2*nd*. The larger the "Air Warmer" or Stove, the more work it will do with a given quantity of fuel.

3*rd*. It is less labor to tend it, and not being necessary to run it up to a great heat, the air is never burned, but simply *warmed*.

DIRECTIONS.—1*st*. When a fire is made the Fresh Air Duct should *always be open*, but it may be closed in part at times, as when the wind blows directly into it, on a very cold day, but in moderate weather it should be wide open.

2*nd*. The Exhaust Shaft should never be closed at all. If you wish to stop the air going out, simply stop it coming in.

3*rd*. Build fire as in any stove. But with the Ruttan Air Warmer after the fire is well started, close the damper, so as to shut off air.

4*th*. At night put in a quantity of fuel, and *shut* up *all* the dampers and close Fresh Air Duct in part (according to the temperature outside) and your fire will keep well until morning. Then stir out the fire, open the damper and ducts, and go on as before.

THE RIGHT

FOR RUTTAN'S VENTILATION.

WHENEVER this system of ventilation is used in connection with Ruttan's Air-warmers, the following rates will be charged:

Dwelling house from $50 to $300, according to cost.

The rates for extra large and valuable dwellings, or for public buildings, can be ascertained by addressing H. J. Ruttan, Cobourg.

It should be remembered that any one adopting this method of ventilation, will economize enough in fuel in one or two years to pay for its cost, besides the health and comfort which he will enjoy from a constant supply of pure air.

INFRINGEMENTS.

It will be regarded and treated as an infringement on Ruttan's Patent for Ventilating and Warming buildings, wherever the air is exhausted from a room *at, near or under* the floor, or heated air introduced into a room *at or near the ceiling*, or warmed air is *conducted from the furnace or Air-warmer to a room, without artificial tubing.*

RUTTAN'S

Scientific Ventilation.

"Impure air engenders more disease than all other causes combined."—*M. Racore, Paris, France.*

"I aver my belief that defective ventilation especially among the wealthy, is a more fruitful cause of disease and death, particularly in women and children, than any other."—*McCann Gunn, M. D.*

CANADIAN GENIUS TRIUMPHANT.—By which the *absolute* is actually reached in the Ruttan Ventilation. Citizens are respectfully invited to call and see for themselves this triumph of science demonstrated; and witness the manner by which the pure, fresh air of heaven (untainted and free from the corroding influences of carbonic acid, and other destructive agencies,) can be readily introduced and removed every few minutes from every room in the building, from garret to cellar, thereby giving a guarantee of health never before assured to the denizens of large cities and others within range of modern civilization.

Winter and summer by this system of ventilation, pure air is assured.

No dust or insects can reach your bed chambers or parlors.

Although we challenge the world to produce a "Heating Apparatus" in connection with our Ventilation that is so cleanly, so effectual and economical, yet we make the ventilation a specialty, (without regard to warming,) thus opening the field to all the heating firms in the country to guarantee the warming of all classes of buildings in connection with our system of Ventilation. In all cases, if desired, we will contract for "warming and ventilation," with any kind of fuel.

Physicians, Lawyers, Architects, and professional men, why do you sit in your tightly closed offices, inhaling over and over again vitated air? Think for a moment how indifferent you are to the laws

of health. Investigate our system of Office Ventilation and you will adopt it.

We would refer to the following named gentlemen and buildings for the successful working of our ventilation:

S. Powell, Gen. Ticket Ag't C. B. & Q. R. R.
M. Heath, 170 Randolph street.
N. Sherwood, & Co., 21 Washington street.
G. P. Randal, Architect.
C. Chapman, Architect.
R. Rose, Architect.
Nichols & Nichols, Architects of Chicago.
All the School Buildings in Bloomington and Decatur, Ill.
Iowa Agr. College, Ames, Iowa.
M. E. Church, Muscatine, Iowa.

and hundreds of others are using it with great delight, as may be seen by pamphlets at our office. The following letters speak for themselves.

Waterloo, Iowa.

W. A. Pennell & Co.—Gents:—I adopted your Ruttan system two years since. Time and experience confirm the good opinion I had of it at the beginning. Every room in my house, large and small, up stairs and down, kitchen, bath-room and panty, has this ventilation, and we could not get along without it. We have a pure and delightful atmosphere in all rooms, at all times, day and night. We have no "kitchen odors" in rooms other than the kitchen, (and even there not long at a time) and that without opening outside doors or windows to air up. Buckwheat cakes, broiled steak, fried ham, boiled cabbage (abominable smell) are served up, and no person outside the kitchen can know, till they see it upon the table, what kind of food has been cooked. The pure, fresh air coming in, carries all odors and smoke under the floor and out. I would adopt your system in all cases, and for any man, or set of men, building public halls, school houses, or churches, without a correct system of ventilation, it is simply *heathenish.*

F. E. CHURCHILL.

Burlington, Iowa.

W. A. Pennell & Co.—Gents:—We have used your system of "Warming and Ventilation" in our drug store for two years. It warms *perfectly*, the air is constantly pure, besides we have *no odors of a drug store.*

C. P. SQUIRES & Co.

H. C. HARTWICK, Agent and Engineer of Ventilation,

Room 11, No. 134, La Salle St., Chicago.

Your attention is also invited to a scientific mode of drying, known as "Ruttan's Patent Dry House,"—H. J. Ruttan, Cobourg. All interested in the drying of lumber, tobacco, leather, wool, clothes, fruit, or anything, call and see a demonstration, or call at Sherman House or Matteson House, where it is used for laundries, at J. C. Parsons for wool, and at Harris & Oslander's for lumber.

It is economical and safe. Time, fuel and labor saved.

H. J. RUTTAN,
COBOURG, ONT.,
CANADA.